11th Meeting of the Conference of the Parties to the Convention on Wetlands (Ramsar, Iran, 1971)

"Wetlands: home and destination"

Bucharest, Romania, 6-13 July 2012

Resolution XI.8 Annex 2 (Rev. COP14)

Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance of the Convention on Wetlands (Ramsar, Iran, 1971)

Adopted by Resolution XI.8 on *Streamlining procedures for describing Ramsar Sites at the time of designation and subsequent updates* (2012); Appendix E2 updated by Resolution XIII.12 on *Guidance on identifying peatlands as Wetlands of International Importance (Ramsar Sites) for global climate change regulation as an additional argument to existing Ramsar criteria* (2018); paragraphs 90, 197, 207(a) and 210 updated by Resolution XIV.18 on *Waterbird population estimates to support new and existing Ramsar Site designations under Ramsar Criterion 6 – use of alternative estimates* (2022).

Brief Table of Contents

Where to go for guidance on drafting Ramsar Information Sheets	
RIS Part 0	Section 7.1.3 of this Strategic Framework
RIS Part 1	Section 7.2 of this Strategic Framework
RIS Part 2	Section 6 of this Strategic Framework
RIS Part 3	Section 7.3 of this Strategic Framework
RIS Part 4	Section 7.4 of this Strategic Framework
RIS Part 5	Section 7.5 of this Strategic Framework

Analytical Table of Contents

- Boundaries and size
- Other considerations

E2. Peatlands
- Geographic distribution and extent
- Ecological functions, ecosystem services/benefits, and societal values
- Peatland degradation
- Peatland restoration
- Position within Ramsar's classification system
- Applying the Ramsar Criteria
- Application of Criterion 1 of the Application Guidelines with respect to carbon storage
- Boundaries and size
- The importance of peatland inventories
- Further sources of information on peatlands

E3. Wet grasslands
- Geographic distribution and extent
- Ecological role and functions
- Values, importance and ecosystem services
- Position within Ramsar's classification system
- Applying the Ramsar Criteria

E4. Mangroves
- Geographic distribution and extent
- Ecological role and functions
- Values, importance and ecosystem services
- Position within Ramsar's classification system
- Applying the Ramsar Criteria
- Boundaries and size
- Further sources of information on mangroves

E5. Coral reefs
- Geographic distribution and extent
- Ecological role and functions
- Values, importance and provision of ecosystem services
- Position within Ramsar's classification system
- Applying the Ramsar Criteria
- Boundaries and size
- Further sources of information on coral reefs

E6. Temporary pools
- Geographic distribution and extent
- Ecological role and functions
- Values, importance and provision of ecosystem services
- Position within Ramsar's classification system
- Applying the Ramsar Criteria
- Boundaries and size

E7. Bivalve (shellfish) reefs
- Geographic distribution and extent
- Ecological role and functions
- Values, importance and provision of ecosystem services
- Position within Ramsar's classification system
- Applying the Ramsar Criteria

1. Summary

1. This document is intended to provide the necessary guidance for Contracting Parties to identify Wetlands of International Importance (Ramsar Sites) and describe them at the time of their designation as Ramsar Sites.

2. In particular, the present document:

- outlines the rationale for the selection of Ramsar Sites;
- presents the Convention's vision for an international network (or List) of Ramsar Sites and presents targets for the development of that network;
- presents and explains the Convention's criteria by which Ramsar Sites can be identified;
- describes the Convention's official Information Sheet through the use of which Contracting Parties describe sites at the time of their designation and subsequently; and
- provides guidance on the preparation of the official map of Ramsar Sites required to be produced at the time of designation.

3. The document builds upon and consolidates earlier guidance adopted by the Ramsar Parties, most substantively on the *Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance,* first adopted by the 7th meeting of the Conference of the Contracting Parties (COP7) in 1999, and on the advice for completing Ramsar Information Sheets (RIS) that was first adopted by COP4 in 1990.

4. Although formatted somewhat differently as a consequence of merging these two into one document here, much of the content is unchanged, but it has been re-ordered and edited to improve its clarity and accessibility to users.

2. Introduction

What does this section do? Explains the need for Ramsar Site designation, providing necessary background and context

5. At the time of signing, or when depositing their instrument of ratification or accession to the Convention on Wetlands (Ramsar, Iran, 1971), sovereign states are required under Article 2.4 to designate at least one site as a Wetland of International Importance. Thereafter, as prescribed by Article 2.1, "each Contracting Party shall designate suitable wetlands within its territory for inclusion in the List of Wetlands of International Importance".

6. Assistance with interpreting the key word 'suitable', as used in Article 2.1, is provided in part by Article 2.2, which states that "wetlands should be selected for the List on account of their international significance in terms of ecology, botany, zoology, limnology or hydrology. In the first instance wetlands of international importance to waterfowl at any season should be included".

7. Throughout its evolution, the Convention on Wetlands has developed Criteria for the designation of Wetlands of International Importance (Ramsar Sites) which have been kept under constant review. It has supplemented these with regularly updated Guidelines to assist Contracting Parties in their interpretation and application of the Criteria reflecting the development of conservation science.

8. The strategic direction given to the development of the List of Wetlands of International Importance has previously been rather limited. Most notably, the 6th meeting of the Conference of the Contracting Parties (COP6) urged Parties through the Convention's Strategic Plan 1997-2002 to "increase the area of wetland designated for the List of Wetlands of International Importance particularly for wetland types that are under-represented either at the global or national levels".

Purpose

9. At the time of COP7 in 1999, as the number of wetlands designated for the Ramsar List was fast approaching 1,000, the Convention on Wetlands first adopted the *Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance,* and it has amended and added to it regularly since then. Its purpose is to provide a clearer view, or vision, of the long-term targets or outcomes which the Convention is seeking to achieve through the Ramsar List. Advice is also offered to assist Contracting Parties in taking a systematic approach to identifying their priorities for future designations, in order to create comprehensive national networks of Ramsar Sites which, when considered at the global level, fulfil the stated vision for the Ramsar List.

3. The Vision, objectives and short-term target for the List of Wetlands of International Importance (the Ramsar List)

What does this section do? Explains the purpose of the List of Wetlands of International Importance (Ramsar Sites)

3.1 The Vision for the Ramsar List

10. The Convention on Wetlands has adopted[1] the following vision for the List of Wetlands of International Importance:

The Vision

To develop and maintain an international network of wetlands which are important for the conservation of global biological diversity and for sustaining human life through the maintenance of their ecosystem components, processes and benefits/services.

(In this context, 'ecosystem benefits' are defined in accordance with the Millennium Ecosystem Assessment definition of ecosystem services as "the benefits that people receive from ecosystems".)

[1] As amended by Resolution IX.1 Annex B (2005).

11. Such an international network of wetland sites has to be built from coherent and comprehensive networks of Wetlands of International Importance established within the territory of each Contracting Party to the Convention.

3.2 Objectives for the Ramsar List

12. In order to realize the vision for the Ramsar List, the Contracting Parties, the Convention's International Organization Partners, local stakeholders, and the Ramsar Secretariat work cooperatively towards accomplishing the following five objectives (not in priority order).

Objective 1
To establish national networks of Ramsar Sites in each Contracting Party which fully represent the diversity of wetlands and their key ecological and hydrological functions

13. **1.1**) To have included in the Ramsar List at least one suitable (i.e., internationally important) representative of every natural or near-natural wetland type present in each "biogeographic region" (see Glossary in Appendix G). These biogeographical regions are defined globally, supranationally/regionally, or nationally and applied by the Contracting Party in a form appropriate to that Party.

14. **1.2**) To give priority in determining suitable sites in relation to wetland type to those wetlands that play a substantial ecological or hydrological role in the natural functioning of a major river basin, lake, or coastal system.

15. **1.3)** To use national networks of Ramsar Sites to help achieve the target established by the Convention on Biological Diversity (CBD) (Aichi Target 11)[2] to have conserved, by 2020, at least 17% of terrestrial and inland water areas and 10% of coastal and marine areas.

Objective 2
To contribute to maintaining global biological diversity through the designation and management of appropriate wetland sites

16. **2.1**) To continue to review the development of the Ramsar List and further refine the Criteria for identification and selection of Ramsar Sites, as appropriate, to best promote conservation of biological diversity and wise use of wetlands at the local, subnational, national, supranational/regional, and international levels.

17. **2.2**) To include in the Ramsar List wetlands that support threatened ecological communities or are critical to the survival of endemic species identified as vulnerable, endangered or critically endangered under national endangered species legislation or programmes or within international frameworks such as the IUCN Red List, Appendix I of the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), and the Appendices of the Convention on Migratory Species (CMS or Bonn Convention) and thus to help achieve CBD Aichi Target 12 to prevent the extinction of known threatened species and so improve and sustain their conservation status by 2020.

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2 Convention on Biological Diversity 2010. *The Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets*. Decision X/2.

18. **2.3**) To include in the Ramsar List wetlands critical to the conservation of biological diversity in each biogeographic region.

19. **2.4**) To include in the Ramsar List wetlands that provide important habitat for plant and animal species at critical stages in their life cycle or during adverse conditions.

20. **2.5**) To include in the Ramsar List wetlands that are significant for waterbird and fish species or stocks, as well as other taxa, as determined by the relevant Ramsar Site selection Criteria (see section 6).

Objective 3
To foster cooperation among Contracting Parties, the Convention's International Organization Partners, and local stakeholders in the selection, designation, and management of Ramsar Sites

21. **3.1**) To pursue opportunities between two (or more) Contracting Parties for Ramsar Site "twinning" or cooperative management agreements for wetlands along migratory species routes, across common borders, or with similar wetland types or species (Resolution VII.19).[3]

22. **3.2**) To undertake other forms of cooperative venture between two or more Contracting Parties that can demonstrate or assist in achieving long-term conservation and sustainable use of Ramsar Sites and wetlands in general.

23. **3.3**) To encourage and support, where appropriate, a stronger role for and contribution from non-government and community-based organizations in the strategic development of the Ramsar List and subsequent management of Ramsar Sites locally, subnationally, nationally, supranationally/ regionally, and internationally (Resolution VII.8).

Objective 4
To use the Ramsar Site network as a tool to promote national, supranational/regional, and international cooperation in relation to complementary environment treaties

24. **4.1**) To use Ramsar Sites, alongside other appropriate wetlands, as baseline and reference areas for national, supranational/ regional, and international environmental monitoring to detect trends in changes in biological diversity, climate change, and the processes of desertification.

25. **4.2**) To implement conservation and sustainable use demonstration projects at Ramsar Sites which will also provide tangible illustrations of cooperation with appropriate international environment treaties[4], notably the achievement of the targets established by CBD's Strategic Plan for Biodiversity 2011-2020.

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3 Turkey entered a reservation to the adoption by consensus of this paragraph of the Resolution. The text of the reservation appears in paragraph 453 of the COP11 Conference Report.

4 Among such MEAs are the Convention on Biological Diversity, the United Nations Framework Convention on Climate Change, the Convention to Combat Desertification, the Convention on International Trade in Endangered Species of Wild Flora and Fauna, the World Heritage Convention, and the Convention on Migratory Species and its Agreements such as the African-Eurasian (Migratory) Waterbirds Agreement, and regional agreements and cooperative initiatives

26. **4.3**) To use networks of Ramsar Sites as policy mechanisms and tools for the implementation of national strategic plans for biodiversity especially in, but not restricted to, the context of the Strategic Plan for Biodiversity 2011-2020.

Objective 5
To use of national Ramsar Site networks to provide essential ecosystem services/benefits, especially related to water, that contribute to human health, livelihoods and well-being

27. **5.1**) To use Ramsar Sites as demonstration areas for the provision of ecosystem services/benefits related especially to water and to their contribution to human health, livelihoods and well-being, if necessary involving restoration, thus contributing to the achievement of CBD Aichi Target 14.

3.3 Short-term target for the Ramsar List

28. The Convention stresses the importance of wetlands as rich centres of biological diversity and productivity and as systems that support the health, livelihoods and well-being of human populations, and the Parties are concerned at the continuing loss and degradation of wetlands in many parts of the world. In response to this concern, the Parties set the following short-term target for the Ramsar List, as Key Result Area (KRA) 2.1.iii in the Strategic Plan 2009-2015 (Resolution X.1, 2008):

By 2015, at least 2,500 Ramsar sites designated worldwide, covering at least 250 million hectares.

3.4 Wetlands of International Importance and the Ramsar principle of wise use

29. Under the Ramsar Convention on Wetlands the two concepts of wise use and site designation are fully compatible and mutually reinforcing. Contracting Parties are expected to designate sites for the List of Wetlands of International Importance "on account of their international significance in terms of ecology, botany, zoology, limnology or hydrology" (Article 2.2), **AND** 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" (Article 3.1).

30. The Ramsar Strategic Plan adopted at COP6 (1996), following on from the definition adopted by COP3 in 1987, equated "wise use" with sustainable use. Contracting Parties to the Convention also recognize that wetlands, through their ecological and hydrological

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such as the North American Waterfowl Management Plan, the Western Hemisphere Shorebird Reserve Network, the Asia-Pacific Migratory Waterbird Conservation Strategy 2001-2005, the Mediterranean Wetlands Initiative (MedWet), the Secretariat of the Pacific Regional Environment Programme (SPREP), Southern Africa Development Community (SADC), Association of the South East Asian Nations (ASEAN), the European Union's Natura 2000 network, the Emerald Network of the Bern Convention on the Conservation of European Wildlife and Natural Habitats, the Pan-European Biological and Landscape Diversity Strategy, the Wetlands Programme for the High Andes, the Treaty on Amazon Cooperation, the Central American Commission on Environment and Development (CCAD), amongst others.

functions, provide invaluable services, products and benefits enjoyed by, and sustaining, human populations. Therefore, the Convention promotes practices that will ensure that all wetlands, and especially those designated for the Ramsar List, will continue to provide these functions and values for future generations as well as for the conservation of biological diversity.

31. Ramsar COP9 (2005) updated the definition of wise use of wetlands to:

"the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development"
(Resolution IX.1 Annex A)

Note: Two footnotes were attached to the this definition:

i) Including *inter alia* the Convention on Biological Diversity's "Ecosystem Approach" (CBD COP5 Decision V/6) and that applied by HELCOM and OSPAR (Declaration of the First Joint Ministerial Meeting of the Helsinki and OSPAR Commissions, Bremen 25-26 June 2003).

ii) The phrase "in the context of sustainable development" is intended to recognize that whilst some wetland development is inevitable and that many developments have important benefits to society, developments can be facilitated in sustainable ways by approaches elaborated under the Convention, and it is not appropriate to imply that 'development' is an objective for every wetland.

Ramsar Sites and the wise use principle

The act of designating (listing) a wetland as internationally important under the Convention is an appropriate first step along a conservation and sustainable use pathway, the endpoint of which is achieving the long-term wise (sustainable) use of the site.

32. Article 3.2 of the Convention determines that "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". Accordingly, the Ramsar Convention has developed the concept of "ecological character" for wetlands, which is defined as:

"Ecological character is the combination of the ecosystem components, processes and benefits/services that characterise the wetland at a given point in time."
(Resolution IX.1 Annex A, 2005)

(In this context, 'ecosystem benefits' are defined in accordance with the Millennium Ecosystem Assessment definition of ecosystem services as "the benefits that people receive from ecosystems".)

33. Contracting Parties are expected to manage their Ramsar Sites in such a way as to maintain the ecological character of each site and, in so doing, retain those essential ecological and hydrological functions which ultimately provide its ecosystem services. Ecological character is therefore an indication of the 'health' of the wetland, and Contracting Parties

are expected to describe the site at the time of designation using the approved Ramsar Site Information Sheet (Appendix A) in sufficient detail to provide a baseline for subsequent monitoring to detect any changes to these ecological and hydrological attributes.

34. Changes to ecological character outside its natural range of variation may signal that uses of a site, or externally derived impacts on the site, are unsustainable and may lead to the degradation of natural processes and thus the ultimate breakdown of the ecological, biological and hydrological functioning of the wetland.

35. The Ramsar Convention has developed tools for monitoring ecological character and also for the development of management plans for Wetlands of International Importance. In preparing such management plans, which all Contracting Parties have been strongly urged to do, issues such as the impact of human activities on the ecological character of the wetland, the economic and socio-economic values of the site (especially for local communities), and the cultural values associated with the site need to be considered. Contracting Parties have also committed to including within management plans a regime for regular and rigorous monitoring to detect changes in ecological character (Resolutions VII.10 and X.15).

4. Establishing a national network of Ramsar Sites

4.1 Networks of sites and what they are for

36. Networks of protected areas serve multiple purposes. Created through the protection and management of multiple sites, they can provide for:

    i) the requirements of migratory species as they undertaken their annual cycle of movements;
    ii) the conservation of multiple local populations of a species, thus contributing to the survival of metapopulations of species;
    iii) the conservation of patterns of diversity at scales larger than an individual site – for example, conservation of either several examples of similar wetland types or a range of different wetland types present within a region; and/or
    iv) the support of ecological or hydrological processes operating at wide geographical scales, for example, a network of sites from the headwaters of a river to its terminus in a coastal estuary.

37. In order to minimize vulnerability and risk, a strategy of selecting sites so that the variety of values at stake is spread throughout the largest possible number of sites (geographical spread) may be appropriate. A strategy such as this provides insurance against the total loss of a resource caused by localized impacts such as fire, flooding, disease or inappropriate land-use decisions. This kind of strategy also helps the chances of recovery from such events by offering a spread of gene pools for potential recolonization. In addition, site networks might need to include some "spare" resources for emergencies, such as sheltered refuges for birds in unusually severe weather (Pritchard 2006).

38. Networks of protected areas can be created at several scales, from local or provincial to national or supranational/regional (such as for example the European Union's Natura 2000 network), whilst the Ramsar List itself is an example of a global site network.

39. In developing any network of protected areas, at any scale but especially nationally, it is critical to establish network objectives. These are crucial to any assessment of network 'coherence' – the extent to which the network is considered complete. Useful guidance on objective setting for site networks is given by Schafer (1990), Pritchard (2006), Langhammer *et al.* (2007) as well as elsewhere in this Strategic Framework.

40. The fundamental first step in establishing any network of protected areas is undertaking a national wetland inventory (see section 4.2 below). Inventories provide essential information on the extent and location of wetland types (or wetland species) within a geographic area from which a network of protected areas can be selected according to established objectives (Langhammer 2007, Ramsar Convention Secretariat 2010c).

4.2 The process of undertaking a national review of potential Ramsar Sites

41. This section provides guidance on taking a systematic approach to identifying priorities for future designations, in order to create coherent, comprehensive national networks of Ramsar Sites which, when considered as a global network, will help to fulfil the vision for the Ramsar List. When developing and implementing a systematic approach to identifying the priority wetlands for designation as Ramsar Sites, Contracting Parties should consider the following issues.

42. **Review national objectives**. As a precursor to developing a systematic approach for identifying future Ramsar Sites, Parties should give careful consideration to the Objectives set out in Section 3 of this Strategic Framework. Those objectives provide an essential basis for the creation of a national network of Ramsar Sites and the extent to which that can contribute to the vision for the List of Wetlands of International Importance.

43. **Territory of the Contracting Parties and transfrontier situations**. Wetland inventories should be certain to take into consideration all parts of the territory of the Contracting Party. In accordance with Article 5 of the Convention and the *Guidelines for international cooperation under the Ramsar Convention* (Resolution VII.19, 1999), special consideration should be given to identifying and designating transfrontier wetlands, not just those that occur across national boundaries but also those that straddle internal jurisdictional boundaries such as between neighbouring provinces (see Section 5.11.2 below).[5]

44. **Inventories and data.** Contracting Parties are urged to establish the extent and quality of information that has been collected on wetlands within their territory and take steps to complete an inventory if this has not yet been done. Inventories should be undertaken using accepted models and standards as advocated by the Ramsar Convention (see Resolutions VII.20 and VIII.6 and Ramsar Convention Secretariat 2010c). It is important to stress that the lack of an inventory should not, however, prevent designations where adequate information is already available for some sites.

45. Consistent with the developing scientific knowledge of the status and distribution of wetlands, their associated plants and animals, and their functions and values, national

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5 Turkey entered a reservation to the adoption by consensus of this paragraph of the Resolution. The text of the reservation appears in paragraph 453 of the COP11 Conference Report.

wetland inventories and/or lists of potential Ramsar Sites should be subject to periodic review and updating (Strategy 1.1 of the Ramsar Strategic Plan 2009-2015).

46. **Supranational/regional level guidance.** Contracting Parties should also be aware that in some instances they may require more detailed guidance at the supranational/regional level in establishing the relative importance of sites for possible designations. This may apply in the following situations:

    i) where plant or animals species do not occur in large concentrations (such as migratory waterbirds in northern latitudes) within the country; or
    ii) where collection of data is difficult (particularly in very large countries); or
    iii) where there may be a high degree of spatial and temporal variability of rainfall – particularly in semi-arid or arid zones – resulting in dynamic use of complexes of temporary wetlands within and between years by waterbirds and other mobile species and where the patterns of such dynamic use are insufficiently known; or
    iv) where, for certain types of wetland such as peatlands, coral reefs, karst and other subterranean hydrological systems, there may be limited national expertise as to the range and significance of international variation (see Appendix E for additional guidance on the identification and designation of specific wetland types); or
    v) where several biogeographic regions come together and the transition zones may have high levels of biological diversity.

47. **Considering all of the Ramsar Criteria and all species.** Contracting Parties are urged to consider all of the Criteria fully when developing a systematic approach. Article 2.2 of the Convention indicates that sites should be considered on the basis of their "ecology, botany, zoology, limnology or hydrology". Under the Ramsar Criteria, this is further clarified in terms of wetland type and conservation of biological diversity.

48. Contracting Parties should also aim to use the Criteria appropriately, meaning that although specific criteria have been developed for waterbirds (Criteria 5 and 6), for fish (Criteria 7 and 8) and for non-avian animals (Criterion 9), these are not the only wetland taxa for which Ramsar Sites can and should be listed. Criteria 2, 3 and 4 provide latitude to identify sites for any wetland species, as well as for waterbirds, fish and non-avian animalas, where appropriate. There is also a risk that less obvious species and the microbiota may be overlooked in these considerations, and care should be exercised to ensure that all components of biological diversity are taken into consideration.

49. **Prioritising.** Having systematically applied the Criteria to develop a list of wetlands that qualify for designation, Contracting Parties are encouraged to identify priority candidate sites. Particular weight should be given to designating sites which include wetland types, or wetland species, that are either unique/endemic to the Contracting Party (found nowhere else in the world) or for which that country holds a significant proportion of the total global extent of a wetland type or population of a wetland species.

5. General issues and guidance for Ramsar Site description

5.1 Definition of a wetland

50. For each Contracting Party it is important to reach an understanding at the national level of how the Ramsar definition of a wetland is to be interpreted and of the biogeographic regionalization to be applied. The Ramsar definition of 'wetland' is very broad, reflecting the purpose and global scale of the Convention, and it gives Contracting Parties great scope and flexibility for ensuring compatibility between national, supranational/regional, and international wetland conservation efforts.

The Ramsar definition of 'wetland'

"Wetlands are 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" (Article 1.1). In addition, Ramsar Sites "may incorporate riparian and coastal zones adjacent to the wetlands, and islands or bodies of marine water deeper than six metres at low tide lying within the wetlands" (Article 2.1).

51. Importantly, the Convention aims at the listing of natural or semi-natural wetlands, but also allows for the designation of purpose-built, or human-made, wetlands, as long as they satisfy at least one of the Criteria specified in section 6 and Appendix D. The Convention's classification system for wetland type (see Appendix B) indicates the full range which Contracting Parties are urged to consider for possible listing under the Ramsar Criteria as representative, rare or unique wetlands (see Section 6.1.1, Criterion 1).

5.2 Ramsar wetland classification system

What does this section do? Explains Ramsar's wetland classification system, how it was derived and what it is for

52. Many national wetland definitions and classifications are in use. They have been developed in response to different national needs and take into account the main biophysical features (generally vegetation, landform and water regime, sometimes also water chemistry such as salinity) and the variety and size of wetlands in the locality or region being considered.

53. The Ramsar Classification System first adopted by COP4 in 1990 and amended in 1996 (Resolution VI.5) has value as a basic internationally applicable habitat description for sites designated for the Ramsar List of Wetlands of International Importance, but does not readily accommodate description of all wetland habitats in the form and level of description that are now commonly included in many wetland inventories. When the Ramsar wetland classification system was first developed it was not anticipated that it would be used for inventory purposes, so its usefulness as a habitat classification for any specific wetland inventory should be carefully assessed (Ramsar Convention Secretariat 2010c).

54. **The following sections give guidance on completing the different parts and fields of the Ramsar Site Information Sheet (RIS). Each is cross-referenced accordingly.**

5.2.1 Wetland type(s) in the Ramsar Site

☞ **RIS field 16**

- **See also: Appendix B, Ramsar classification system for wetland type**
- **See also: Section 7.2.7, Map of the Ramsar Site**
- **See also: Section 7.2.8, Geographical coordinates**
- **See also: Section 7.2.10, Area**

55. When describing wetland types present at a Ramsar Site in the Ramsar Information Sheet (RIS), be sure to indicate the full range of wetland types occurring within the site in column "a" of field 16. In column "b" rank the four most abundant types by area (1 = most abundant, etc.). If wetland types are known by local names or have different names used in national wetland classification systems, these can be added.

56. The Ramsar Classification System for Wetland Type (see Appendix B) provides the description of what types of wetland are covered by each of the wetland type codes. Note that the wetland types are grouped in three major categories: marine-coastal, inland, and human-made wetlands, and that wetland types under two or more of these categories may be present within a Ramsar Site, particularly if it is large.

57. Since some Marine/Coastal wetland types (e.g., Estuarine waters (type *F*) or Intertidal Forested Wetlands (type *I*)) can occur far inland from the coastline, and conversely Inland Wetlands types can occur close to the coastline, please also indicate with additional text in this section the general geographical location of the site relative to the coastline, as either inland or marine/coastal.

58. If the information exists, if possible provide the area of the designated site composed of each wetland type (in column "c"), although it is recognized that this may be difficult for large sites with a wide variety of wetland types.

59. If the designated site includes areas of non-wetland habitat, for example where such parts of a catchment are included, it is helpful here to indicate the presence of these habitats and, if possible, the area of each.

5.3 Biogeographic regionalizations

☞ **RIS field 11**

What does section do? Explains Ramsar's approach to biogeographic regionalizations

60. Under Criterion 1, Contracting Parties are expected to identify sites of international importance within an agreed biogeographic regionalization. The Convention (see Appendix G) defines this term as "a scientifically rigorous determination of regions as established using biological and physical parameters such as climate, soil type, vegetation cover, etc." Note that for many Contracting Parties, biogeographic regions will be transboundary in nature and will require collaboration between countries to define those wetland types which are representative, unique, etc. In some regions and countries, the term 'bioregion' is used as a synonym for 'biogeographic region'.

5.3.1 Marine bioregionalization schemes

61. The major assessment of the Marine Ecoregions of the World (MEOW) (Spalding *et al.* 2007) has developed a new global system of biogeographic regionalization for coastal and shelf areas. It presents a nested system of 12 realms, 62 provinces, and 232 ecoregions (see www.nature.org/ourinitiatives/regions/northamerica/unitedstates/colorado/scienceandstrategy/marine-ecoregions-of-the-world.pdf and http://conserveonline.org/workspaces/ecoregional.shapefile/MEOW/view.html). This system provides considerably better spatial resolution than earlier global systems, yet it preserves many common elements from earlier global and regional systems, so it can be cross-referenced to many existing regional marine biogeographic classifications.

62. As the MEOW classification has been developed through wide international consensus, has received broad international acceptance, and incorporates many pre-existing classifications, it is recommended for application by the Ramsar Convention (at its ecoregional scale) with respect to coastal and near-shore marine areas within the scope of the Convention.

5.3.2 Terrestrial bioregionalization schemes

63. Three principle biogeographic regionalization schemes have been developed for use in conservation planning and assessment in terrestrial environments (Udvardy 1975, Bailey 1998, Olson *et al.* 2001). None of these schemes addresses inland wetland ecosystems, as they are largely derived from the distributions and similarities of other terrestrial ecosystems (forests, grasslands, etc.). They have differing spatial resolutions and have been developed for different purposes based on different types of data.

Udvardy's Biogeographical Provinces (Udvardy 1975)

64. Intended to provide a satisfactory classification of the world's biotic areas and to provide a framework for conserving species as well as ecological areas, the classification is a hierarchical system of geographical areas (Realms, Biomes and Provinces) based on the distribution of species and the distribution of ecosystem units. Realms are based on phylogenetic subdivisions, Biomes on both vegetation and climatic features, and Provinces on fauna, flora and ecology.

Bailey's Ecoregions (Bailey 1998)

65. Originally intended to illustrate how the national forests of the U.S. fit within the global ecoregional scheme, an ecoregion is defined here as any large portion of the Earth's surface over which the ecosystems have characteristics in common. There are three levels within the classification system: Domains, Divisions and Provinces. Ecoregions are based on macroclimate following the theory that macroclimates are among the most significant factors affecting the distribution of life on Earth. Temperature and rainfall along with climatic zones were used to identify the Domains and Divisions. Provinces were based on the physiognomy of the vegetation, modified by climate.

WWF Terrestrial Ecoregions (Olson *et al.* 2001)

66. Derived primarily as a tool for prioritizing areas for conservation, the WWF Terrestrial Ecoregions comprise relatively large units of land or water containing a geographically distinct assemblage of natural communities. These communities share a majority of their species, ecological dynamics and environmental conditions, and they interact in ways that are critical for their long-term persistence. The hierarchical classification system consists of Realms, Biomes, and Ecoregions, which reflect the distribution of distinct biotas.

67. In addition, WWF-US has recently been leading the development of a scheme for Freshwater Ecoregions of the World (FEOW) (Abell *et al.* 2008), which are being derived by aggregating and subdividing watersheds based on the distribution patterns of aquatic species, notably fish.

68. In Europe, a biogeographic regionalization scheme (http://dataservice.eea.europa.eu/atlas/viewdata/viewpub.asp?id=3641) contains 11 biogeographic regions and forms the basis for establishing the Natura 2000 network of the Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora and the Emerald Network of the Convention on European Wildlife and Natural Habitats (Bern Convention) (www.eea.europa.eu/data-and-maps/data/biogeographical-regions-europe-2008).

69. As these schemes have been or are being developed for different purposes and using different criteria, and have not been assessed or their common features and differences articulated, it is not proposed at this stage that any single inland/terrestrial classification should be adopted for use by the Convention. Contracting Parties are encouraged to make such use of these schemes as they consider appropriate, or to draw to the attention of the Scientific and Technical Review Panel (STRP) other schemes that better represent the biogeographical distribution of inland wetlands, keeping in mind the differences in scale necessary to present wetland distribution nationally and internationally.

70. Recording precise locational information on the Ramsar Information Sheet (Appendix A) will allow Ramsar Sites to be placed within the context of each or any of these schemes, depending on which is most appropriate for any particular international analytical purpose. It would also allow analyses to be undertaken with respect to international regionalization schemes that do not have global coverage, for example, biogeographic regionalizations used within Europe (above).

71. Additional information and advice relating to the use of biogeographic regionalization schemes in the context of the Ramsar Convention is provided by Rebelo, Finlayson & Stroud (in prep. 2012). This publication includes examples of the use of MEOW in analytical contexts to assess the coverage in the Ramsar List, and gaps in coverage, of specific coastal and near-shore marine wetland types, including mangroves, coral reefs, and saltmarshes.

5.4 Representation

72. The reasons for which such wetland types are as yet under-represented in the Ramsar List are various. They may include:

- lack of recognition of the existence of particular wetland types within a particular territory;
- lack of recognition that coastal and marine wetland types such as mangroves and coral reefs fall within the Ramsar definition of wetlands and so are eligible for designation as Ramsar Sites;
- difficulty in applying the guidance on completing the Information Sheet on Ramsar Wetlands (RIS) for Ramsar Site designation, particularly in relation to the delimitation of appropriate boundaries,
- uncertainty, especially for coral reefs, as to which particular features of these habitat types indicate the best representative examples of such wetlands under Ramsar Criterion 1;
- uncertainty, in the case of peatlands and wet grasslands, as to which wetland types in the Ramsar Classification System for Wetland Type apply, since these habitat types can occur in a number of different categories; and
- for peatlands, a lack of recognition that a wetland is a peat-based system if wetlands are assessed only for their vegetational characteristics (for example, tropical woodland).

73. All Ramsar Criteria (section 6.1) for the designation of Wetlands of International Importance can be applied to the identification and designation of peatland, wet grassland, mangrove, coral reef, and temporary pond wetland types.

5.5 Legal status and complementary conservation frameworks

☞ **RIS field 31**
♦ **See also: Section 7.4.4, Conservation measures taken**

74. **Legal protected area status.** Contracting Parties should be aware that Ramsar Site designation does not require that the wetland in question must enjoy any type of previously conferred protected area status or must necessarily acquire this after designation. Likewise, wetlands being considered for designation need not be pristine areas which have not been subjected to impacts from human activities.

75. In fact, Ramsar designation can be used to confer a special type of recognition on these areas by virtue of elevating them to the status of sites recognized as internationally important. In this way, Ramsar designation could represent the starting point for a process of recovery and rehabilitation of a particular site, provided the site meets the Criteria for listing under the Convention when it is designated.

76. While the existing protected area status of a site should not be a factor in determining priorities for listing, Contracting Parties are urged to be mindful of the need for consistency in approach when officially designating wetland sites under international conventions and treaties as well as national policy or legal instruments. If a wetland site gains national protected area status because it provides critical habitat for an endemic wetland-dependent species, the Criterion indicates that it will qualify as a Ramsar Site. Contracting Parties are therefore urged to review all of their current, proposed and future protected areas to ensure that consistency is applied (see Section 4 above).

77. **Complementary international frameworks.** When considering Ramsar Site designations Contracting Parties are urged, as specified in Objective 4.2 (see paragraph 25 above), to consider the opportunities this may also provide for contributing to other established and developing initiatives under related international and regional environment conventions and programmes. This applies in particular to the Convention on Biological Diversity and the Convention on Migratory Species and its Agreements, such as the African-Eurasian Waterbirds Agreement. Regionally, this may apply to cooperative initiatives such as the North American Waterfowl Management Plan, the Western Hemisphere Shorebird Reserve Network, the Asia-Pacific Migratory Waterbird Conservation Strategy 2001-2005, the Mediterranean Wetlands Initiative (MedWet), the Secretariat of the Pacific Regional Environment Programme (SPREP), the Southern Africa Development Community (SADC), the Association of the South East Asian Nations (ASEAN), the European Union's Natura 2000 network, the Emerald Network of the Bern Convention on the Conservation of European Wildlife and Natural Habitats, the Pan-European Biological and Landscape Diversity Strategy, the Wetlands Programme for the High Andes, the Treaty on Amazon Cooperation, the Central American Commission on Environment and Development (CCAD), etc.

5.6 Site delineation and boundary definition

♦ **See also: Appendix C: Additional guidelines for the provision of maps and other spatial data for Ramsar Sites**

78. **Smaller sites should not be overlooked**. In developing a systematic approach to Ramsar Site designation, Contracting Parties are encouraged to recognize that potential Ramsar Sites are not necessarily the largest wetlands within the territory. Some wetland types either never were or are no longer found as large wetland systems, and these should not be overlooked. They may be especially important in maintaining habitat or ecological community-level biological diversity.

79. **Boundary definition of sites.** When designating sites, Contracting Parties are encouraged to take a management-oriented approach to determining boundaries, recognizing that these should allow management of the site to be undertaken at the appropriate scale for maintaining the ecological character of the wetland. Article 2.1 of the Convention indicates that Ramsar Sites "may incorporate riparian and coastal zones adjacent to the wetlands, and islands or bodies of marine water deeper than six metres at low tide lying within the wetlands". For very small and therefore potentially vulnerable sites, Contracting Parties are encouraged to include buffer zones around the wetland but within the designated Ramsar Site boundary. These may also be a useful management tool for subterranean system wetlands as well as for larger sites.

80. In determining the boundaries of sites identified as habitat for animal species, these should be established so as to provide adequately for all the ecological and conservation requirements of those populations. In particular, large animals, species at the top of food chains, those with large home ranges, or with feeding and resting areas that are widely separated, will generally require substantial areas to support viable populations. If it is not possible to designate a site extending to the entire range used or accommodating viable (self-sustaining) populations, then additional measures relating to both the species and its

habitat should be adopted in the surrounding areas (or the buffer zone). These measures will complement the protection of the core habitat within the Ramsar Site.

81. While some sites considered for designation will be identified at landscape scale, containing substantial elements of whole wetland ecosystems, others may be smaller. In selecting and delimiting such more restricted wetlands, the following guidance may assist in determining their extent:

    i) As far as possible, sites should include complexes or mosaics of vegetation communities, not just single communities of importance. Note that wetlands with naturally nutrient poor (oligotrophic) conditions generally exhibit low diversity of species and habitats. In these wetlands, high diversity may be associated with low conservation quality (indicated by markedly altered conditions). Thus, diversity must always be considered within the context of the norms of the wetland type.

    ii) Zonations of communities should be included as completely as possible in the site. Important are communities showing natural gradients (transitions), for instance from wet to dry, from salt to brackish, from brackish to fresh, from oligotrophic to eutrophic, from rivers to their associated banks, shingle bars and sediment systems, etc.

    iii) Natural succession of vegetation communities often proceeds rapidly in wetlands. To the greatest extent possible and where these exist, all phases of succession (for example, from open shallow water, to communities of emergent vegetation, to reedswamp, to marshland or peatland, to wet forest) should be included in designated sites. Where dynamic changes are occurring, it is important that the site is large enough so that pioneer stages can continue to develop within the Ramsar Site.

    iv) Continuity of a wetland with a terrestrial habitat of high conservation value will enhance its own conservation value.

82. The smaller the site, the more vulnerable it is likely to be to outside influences. In determining boundaries of Ramsar Sites, particular attention should be given to ensuring that wherever possible the limits of the sites serve to protect them from potentially damaging activities, especially those likely to cause hydrological disturbance. Ideally, boundaries should include those areas of land necessary to provide and maintain the hydrological functions needed to conserve the international importance and integrity of the site. Alternatively, it is important that planning processes are operating to ensure that potential negative impacts arising from land-use practices on adjoining land or within the drainage basin are suitably regulated and monitored to provide confidence that the ecological character of the Ramsar Site will not be compromised.

83. The degree to which buffer zones are included with a site boundary is a national decision and will typically depend on national policies to land-use planning and control. The objective of a buffer zone is to ensure that land-use influences just outside a site do not have negative impacts on the ecological character of the site. Sometimes this is achieved by including buffer zones with the site boundary, in other cases it can be achieved through policies related to land uses. The most appropriate approach will vary from site to site and will also depend on national legislative frameworks.

84 Further guidance on protected area boundary delineation is given by Langhammer *et al.* (2007).

5.7 Species

What does this section do? Emphasizes general considerations about species (including alien invasive species)

5.7.1 Flagship and keystone species

85. The concepts of indicator, flagship, and keystone species are important for Contracting Parties to consider. The presence of "indicator" species can be a useful measure of good wetland quality. Well-known "flagship" species can also have great symbolic and awareness-raising value for wetland conservation and wise use, whereas "keystone" species play vital ecological roles. Wetlands with significant populations of indicator, flagship and/or keystone species may merit special consideration as sites of international importance.

5.7.2 Contexts for species

86. **Species presence in perspective.** When applying population figures to establish the relative importance of sites for designation, Contracting Parties should take care to put these within an appropriate context. It may be that in terms of relative importance for biological diversity conservation, a site providing habitat for a rare species is a higher priority for listing and subsequent management action than a site which has larger numbers of a more common species.

87. **Less visible interests should not be overlooked**. Fish are not only an integral part of aquatic ecosystems, but are a vital source of food and income for people throughout the world. However, the production of fisheries in many parts of the world is declining as a consequence of unsustainable harvest regimes and the loss and degradation of habitats, including spawning and nursery areas. Underwater species such as fish and other aquatic fauna and flora can often be overlooked in the development of cases for Ramsar Site designation, unlike more visible animals and plants. Such aquatic interests should be carefully and systematically reviewed.

5.7.3 Non-native species

88. The introduction and spread of non-native species is of great concern due to the impact they can have on the biological diversity and natural functioning of wetland ecosystems (see Resolutions VII.14 and VIII.18 on invasive species and wetlands). It follows, therefore, that the presence of introduced or non-native species should **not** be used to support a case for designating a site as a Wetland of International Importance. In some circumstances native species can also be considered invasive to wetlands due to the disruption and imbalances they can introduce into the ecosystem. It is possible for introduced non-native species to be rare or endangered in their native habitats. Such situations need to be carefully assessed by the Contracting Party.

5.7.4 Species taxonomy

☞ **RIS fields 12, 17 & 18**
⧫ **See also: Section 7.3.5, Plant species**
⧫ **See also: Section 7.3.7, Animal species**

89. In describing species occurrence within Ramsar Sites in the Ramsar Information Sheet (especially in RIS fields 12, 17 and 18), please use the international taxonomic standards adopted by the Convention on International Trade in Endangered Species (CITES) for all species other than waterbirds. The most recent reference source is at CITES Resolution 12.11 (Rev. COP15) (www.cites.org/eng/res/12/12-11R15.php) and this is revised following each CITES COP.

90. For waterbirds, please use Wetland International's *Waterbird Population Estimates* as the definitive source of information on populations and species taxonomy (see also sections 6.1.5 and 6.1.6 below). (Note that there are only a few differences between the nomenclatures adopted by *Waterbird Population Estimates* and CITES). The most recent reference source is *Waterbird Population Estimates,* 5th edition, available in the Waterbird Populations Portal.[6]

5.8 Wetlands in the landscape: connectivity and site clusters

91. **Site clusters.** Clusters of small sites, or individual small "satellite" sites associated with larger areas, should be considered for listing where these are:

    i) component parts of a hydrologically linked system (e.g., a complex of valley mires, a system of groundwater-fed wetlands along a spring line, or karst and subterranean wetland systems); and/or
    ii) linked in their use by a common population of animal (e.g., a group of alternative roost or feeding areas used by one population of waterbirds); and/or
    iii) formerly geographically continuous areas now separated by human activity; and/or
    iv) otherwise ecologically interdependent (e.g., sites forming part of a distinct wetland district/landscape with a common developmental history and/or supporting discrete species populations); and/or
    v) found in arid or semi-arid zones, where complexes of dispersed wetlands (sometimes of a non-permanent nature) can both individually and collectively be of very great importance for both biological diversity and human populations (e.g., essential links in incompletely known chains).

92. Where a cluster of sites is designated, the Ramsar Information Sheet should state clearly the rationale for treating the component parts collectively as one listed site.

5.9 Hydrology

☞ **RIS fields 12 & 26**
⧫ **See also: Section 7.3.16, Ecosystem services**

[6] Updated by Resolution XIV.18 on *Waterbird population estimates to support new and existing Ramsar Site designations under Ramsar Criterion 6 – use of alternative estimates* (2022)

93. **Hydrological values**: A description of the principal hydrological values of the wetland, for example, the ecosystem services that they provide to people. This may include, but not necessarily be limited to, the site's role in flood control, groundwater replenishment, shoreline stabilization, sediment and nutrient retention and export, climate change modification, and water purification and maintenance of water quality. The hydrology of the site (as opposed to its hydrological values and functions) should be covered under RIS field 20, Water regime.

5.10 Social and cultural values

☞ **RIS field 27**

♦ **See also: Section 7.4.17, Social or cultural values**

94. The Convention has acknowledged (Resolution VIII.19) the intimate links of traditional societies to wetlands and water which have given rise to important cultural values relevant to wetland conservation and wise use, and which have been recognized in the diverse cosmologies of different civilizations and cultures throughout history. Specific physical features of wetlands have contributed to particular ways of managing traditional activities which are of great cultural significance, whilst sustainable traditional uses of wetland resources have frequently created cultural landscapes of significant value to wetland conservation and wise use.

95. Where a Ramsar Site is considered internationally important for holding, in addition to relevant ecological values, examples of significant cultural values, whether material or non-material, linked to its origin, conservation and/or ecological functioning, this can be described in field 27 of the Ramsar Information Sheet.

5.11 Sites on borders

☞ **RIS field 9b**

5.11.1 Internationally shared sites

96. Increasingly, Ramsar Contracting Parties are designating their new and existing Ramsar Sites as Transboundary Ramsar Sites, meaning that an ecologically coherent wetland extends across national borders and the Ramsar Site authorities on both or all sides of the border have formally agreed to collaborate in its management, and have notified the Secretariat of this intent.

97. This is a cooperative management arrangement and not a distinct legal status for the Ramsar Sites involved.

98. A list of such examples is maintained on Ramsar's website (www.ramsar.org/trs).

5.11.2 Trans-provincial sites

99. In identifying potential sites for designation, Contracting Parties are urged not to neglect wetland sites that straddle internal boundaries between different subnational jurisdictions (for example, between provinces, states, or other forms of administrations). The case for

ecologically coherent wetland designations extending across such internal boundaries between different administrations is the same as for internationally shared sites (above).

6. Why is the wetland internationally important?

What does this section do? Introduces the Criteria. What they are for and how to use them. How to document them in a Ramsar Information Sheet.

☞ **RIS field 12**

6.1 Assessing the site against Ramsar's Criteria

100. In this section, the Criteria for identifying internationally important sites are presented, with guidelines for their application, in order to assist Contracting Parties in taking a systematic approach to identifying their priority sites that qualify for designation. These guidelines should be considered in conjunction with the more general guidelines given in section 5 above.

101. Guidance on the appropriate documentation of relevant Criteria is provided in section 6.2.

102. Many sites qualify for Ramsar designation under more than one Criterion: be thorough and precise in selecting all of the Criteria that apply. The specific reasons justifying the application of each Criterion selected should be provided in relevant parts of field 12 of the RIS.

Criteria for the designation of Wetlands of International Importance

<table>
<tr><td>Group A of the criteria

Sites containing representative, rare or unique wetland types</td><td></td><td>Criterion 1:
A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region.</td></tr>
<tr><td rowspan="3">Group B of the criteria

Sites of international importance for conserving biodiversity</td><td rowspan="3">Criteria based on species and ecological communities</td><td>Criterion 2:
A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.</td></tr>
<tr><td>Criterion 3:
A wetland should be considered internationally important if it supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region.</td></tr>
<tr><td>Criterion 4:
A wetland should be considered internationally important if it supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions.</td></tr>
</table>

	Specific criteria based on waterbirds	**Criterion 5:** A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds.
		Criterion 6: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird.
	Specific criteria based on fish	**Criterion 7:** A wetland should be considered internationally important if it supports a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contributes to global biological diversity.
		Criterion 8: A wetland should be considered internationally important if it is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.
	Specific criteria based on other taxa	**Criterion 9:** A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of wetland-dependent non-avian animal species.

Group A of the Criteria: Sites containing representative, rare or unique wetland types

6.1.1 Criterion 1

A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region.

What this Criterion is seeking to achieve

103. Criterion 1 identifies wetlands that are of international importance, within a biogeographical context, as examples of wetland types or habitats (rather than for the species contained within the wetland).

104. The Criterion relates to sites which contain one or more natural or near-natural wetland types which are – nationally - either:

    a) **representative** examples;

b) **rare** examples or
c) **unique.**

105. Objective 1, and in particular Objective 1.2 (paragraph 14 above), indicates that another consideration under this Criterion is to give priority to those wetlands whose ecological character plays a substantial role in the natural functioning of a major river basin or coastal system. Contracting Parties should consider the hydrological functioning of wetlands in determining priority sites under this Criterion. For guidance relevant to biological and ecological roles refer to Criteria 3 and 4.

How to interpret this Criterion – what it means

106. In applying this Criterion systematically, Contracting Parties are encouraged to:

i) determine biogeographic regions within their territory or at the supranational/ regional level using the Convention's recommended regionalization schemes (see Section 5.3);
ii) within each biogeographic region, determine the range of wetland types present (using the Ramsar Classification System for Wetland Type, Appendix B), noting in particular any rare or unique wetland types; and
iii) for each wetland type within each biogeographic region, identify for designation under the Convention those sites which are the best examples.

107. The Criterion refers to the Ramsar Site "containing" the wetland type concerned. This is an important pointer to the fact that the boundary of the site should, where possible, be drawn widely so as to contain the whole hydrological units, rather than defining the Ramsar Site as only a small element of a larger wetland. (See also Section 5.6.)

Guidelines on specific wetland types

108. Peatlands, mangroves, and coral reefs were recognized by the *Global Review of Wetland Resources and Priorities for Wetland Inventory* report to COP7 (1999) as being amongst the wetland ecosystems that are most vulnerable and threatened by habitat loss and degradation, and thus in need of urgent priority action to ensure their conservation and wise use.

109. Additional guidance has been developed (Appendix E) to provide clarification of aspects of the application of this Strategic Framework as they apply to peatlands, wet grasslands, mangroves, and coral reefs, karst and other subterranean wetland types, temporary pools, and bivalve (shellfish) reefs, in particular on the identification and designation of representative wetlands of these habitat types in accordance with the application of this Criterion 1.

What data and information are needed to apply this Criterion?

110. A national wetland inventory is the fundamental requirement for the application of this Criterion, since it is only with such information that it is possible to assess whether a wetland is representative, rare or unique. Guidance on wetland inventory processes is given

in Ramsar Handbooks 13 and 15 (Ramsar Convention Secretariat 2010c, 2010d; see also Appendix H).

111. Information on recommended biogeographical regionalizations is given in section 5.3.

Potential ambiguities and pitfalls

112. Note that as this Criterion relates only to natural or near-natural wetlands, it cannot be applied to types of human-made wetlands.

113. When interpreting the phrase "within the biogeographic region", this should be read as "within that part of the biogeographic region that is within the relevant Contracting Party". In other words, the Criterion is seeking to identify 'best' national examples of particular wetland types.

More detail

114. **Definition of 'representative':** A wetland that is a typical example of a particular wetland type found in a region. Wetland types are defined in Appendix B.

115. **Definition of 'unique':** The only one of its type within a specified biogeographic region.

116. **Definition of 'natural':** When used in Criterion 1, natural (or unmodified) areas are those that still retain a complete or almost complete complement of species native to the area, within a more or less naturally functioning ecosystem.

117. **Definition of 'near natural':** When used in Criterion 1, this means those wetlands which continue to function in what is considered an almost natural way. This clarification is provided in the Criterion to allow for the listing of sites which are not pristine, yet retain ecological values that nonetheless make them internationally important.

118. **Definition of 'wetland types'**: As defined by the Convention's wetland classification system, see Appendix B.

119. **Definition of 'appropriate'**: When applied to the term 'biogeographic region' as here, this means the regionalization which is determined by the Contracting Party to provide the most scientifically rigorous approach possible at the time.

120. **Definition of 'biogeographic region'**: A scientifically rigorous determination of regions as established using biological and physical parameters such as climate, soil type, vegetation cover, etc. Note that for non-island Contracting Parties, in many cases biogeographic regions will be transboundary in nature and will require collaboration between countries to establish representative, unique, etc., wetland types. In some cases, the term bioregion is used synonymously with biogeographic region. See Section 5.3.

121. **Hydrological importance.** As indicated by Article 2 of the Convention, wetlands can be selected for their hydrological importance which, *inter alia*, may include the following attributes. They may:

i) play a major role in the natural control, amelioration or prevention of flooding;
ii) be important for seasonal water retention for wetlands or other areas of conservation importance downstream;
iii) be important for the recharge of aquifers;
iv) form part of karst or underground hydrological or spring systems that supply major surface wetlands;
v) be major natural floodplain systems;
vi) have a major hydrological influence in the context of at least regional climate regulation or stability (e.g., certain areas of cloud-forest or rainforest, wetlands or wetland complexes in semi-arid, arid or desert areas, tundra, peatland, coastal or other wetland systems acting as sinks for carbon, etc.);
vii) have a major role in maintaining high water quality standards.

Where to go for further help or information

122. Although not restricted to wetland ecosystems, IUCN's guidance related to proposed Red List criteria for threatened ecosystems (Rodríguez *et al.* 2010) may be useful in undertaking national assessments of wetland type rarity.

Group B of the Criteria: Sites of international importance for conserving biological diversity

Criteria based on species and ecological communities

6.1.2 Criterion 2

A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.

What this Criterion is seeking to achieve

123. Criterion 2 identifies wetlands that are important for the conservation of such dependent species, either individually or as communities, and reflects the important role that Ramsar Sites have in the conservation of globally threatened species and ecological communities.

124. Objective 2.2 of this Strategic Framework urges Contracting Parties to seek to include in the Ramsar List wetlands that support threatened ecological communities or, through the wetland habitats contained within the site, provide ecological support which is critical to the survival of wetland dependent species identified as vulnerable, endangered or critically endangered under:

a) national endangered species legislation/programmes; and/or
b) international frameworks such as the IUCN Red Lists; and/or
c) Appendix I of CITES and the Appendix I of CMS.

How to interpret this Criterion – what it means

125. The Criterion is non-quantitative and merely requires that the Ramsar Site support threatened species in the categories given. It provides no numerical threshold for the numbers supported in the site concerned, and thus the Criterion is particularly valuable in those cases where a site is known to be important for the species concerned but population assessments are not available.

126. Notwithstanding that small absolute numbers of individuals or sites may be involved, or that only poor quality quantitative data or information may be available, particular consideration should be given to listing wetlands that support globally threatened communities or species at any stage of their life cycle using this Criterion.

127. In accordance with the Convention on Biological Diversity's definition of biological diversity as including "diversity within species, between species and of ecosystems" (CBD Article 2), and in line with guidance related to other Ramsar Criteria which apply to subspecies and populations, where appropriate Criterion 2 can be applied to subspecies and biogeographic populations of threatened species.

128. The Convention has emphasized peatlands, wet grasslands, mangroves, and coral reefs, karst and other subterranean wetland types, temporary pools, and bivalve (shellfish) reefs, as under-represented on the Ramsar List. Since each of these wetland types has been identified as being particularly vulnerable and threatened by habitat loss and degradation, the identification and designation of threatened ecological communities, as well as threatened species, under Ramsar Criterion 2 will often be particularly important.

129. When reviewing candidate sites for listing under this Criterion, greatest conservation value will be achieved through the selection of a network of sites providing habitat for rare, vulnerable, endangered, or critically endangered species. Ideally, the sites in the network will have the following characteristics. They will:

    i) support a mobile population of a species at different stages of its life cycle; and/or
    ii) support a population of a species along a migratory pathway or flyway – noting that different species have different migratory strategies with different maximum distances needed between staging areas; and/or
    iii) be ecologically linked in other ways, such as by providing refuge areas to populations during adverse conditions; and/or
    iv) be adjacent to or in close proximity to other wetlands included in the Ramsar List, the conservation of which enhances the viability of threatened species' population by increasing the size of habitat that is protected; and/or
    v) hold a high proportion of the population of a dispersed sedentary species that occupies a restricted habitat type.

130. Those sites which contribute most to the survival of species or ecological communities locally and as a whole are those which enable its geographic range to be maintained on a long-term basis. The long-term persistence of species is most likely to occur where:

    i) population dynamics data on the species concerned indicate that it is self-sustaining on a long-term basis as a viable component of its natural habitats, and

ii) the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
iii) there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

131. For identifying sites with threatened ecological communities, greatest conservation value will be achieved through the selection of sites with ecological communities that have one or more of the following characteristics. They:

i) are globally threatened communities or communities at risk from direct or indirect drivers of change, particularly where these are of high quality or particularly typical of the biogeographic region; and/or
ii) are rare communities within a biogeographic region; and/or
iii) include ecotones, seral stages, and communities which exemplify particular processes; and/or
iv) can no longer develop under contemporary conditions (because of climate change or anthropogenic interference, for example); and/or
v) are at the contemporary stage of a long developmental history and support a well-preserved paleoenvironmental archive; and/or
vi) are functionally critical to the survival of other (perhaps rarer) communities or particular species; and/or
vii) have been the subject of significant decline in extent or occurrence.

What data and information are needed to apply this Criterion?

132. The biogeographical region context can also apply to certain reasons for the designation of threatened ecological communities under Criterion 2. The biogeographic region encompassing the Ramsar Site and the biogeographic regionalization scheme applied should be provided in RIS field 11, Biogeography.

Potential ambiguities and pitfalls

133. Note also the issues concerning habitat diversity and succession in section 5.6 above, Site delineation and boundary definition.

134. Also be aware of the biological importance of many karst and other subterranean hydrological systems (see specific guidance in Appendix E below).

135. See section 5.7.4 for guidance on species nomenclature and taxonomy.

More detail

136. **Definition of 'critically endangered':** As used by the Species Survival Commission of IUCN. A taxon is Critically Endangered when it is facing an extremely high risk of extinction in the wild in the immediate future, as defined for both animals and plants by the criteria laid out in the *IUCN Red List Categories and Criteria: Version 3.1* (IUCN 2001). See also 'globally threatened species' in Appendix G.

137. **Definition of 'endangered'**: As used by the Species Survival Commission of IUCN. A taxon is Endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future, as defined for both animals and plants by the criteria laid out in the *IUCN Red List Categories and Criteria: Version 3.1*. See also 'globally threatened species' in Appendix G.

138. **Definition of 'vulnerable'**: As used by the Species Survival Commission of IUCN. A taxon is Vulnerable when it is not either Critically Endangered or Endangered but is facing a high risk of extinction in the wild in the medium-term future, as defined for both animals and plants by the criteria laid out in the *IUCN Red List Categories and Criteria: Version 3.1*. See also 'globally threatened species' in Appendix G.

139. **Definition of 'ecological communities'**: Any naturally occurring group of species inhabiting a common environment, interacting with each other especially through food relationships and relatively independent of other groups. Ecological communities may be of varying sizes, and larger ones may contain smaller ones.

140. **Definition of 'ecotone'**: A narrow and fairly sharply defined transition zone between two or more different communities. Such edge communities are typically rich in species.

141. **Definition of 'seral stage':** A phase in the sequential development of a climax community of plant succession.

142. **Definition of 'flyway'** (Guideline for Criterion 2): The concept developed to describe areas of the world used by migratory waterbirds and defined as the migration routes(s) and areas used by waterbird populations in moving between their breeding and wintering grounds (Boere & Stroud 2006). Each individual species and population migrates in a different way and uses a different suite of breeding, migration staging and wintering sites. Hence a single flyway is composed of many overlapping migration systems of individual waterbird populations and species, each of which has different habitat preferences and migration strategies. From knowledge of these various migration systems it is possible to group the migration routes used by waterbirds into broad flyways, each of which is used by many species, often in a similar way, during their annual migrations. Recent research into the migrations of many wader or shorebird species, for example, indicates that the migrations of waders can broadly be grouped into eight flyways: the East Atlantic Flyway, the Mediterranean/Black Sea Flyway, the West Asia/Africa Flyway, the Central Asia/Indian sub-continent Flyway, the East Asia/Australasia Flyway, and three flyways in the Americas and the Neotropics.

143. There are no clear separations between flyways, and the use of the term is not intended to imply major biological significance; rather it is a valuable concept for permitting the biology and conservation of waterbirds, as well as other migratory species, to be considered in broad geographical units into which the migrations of species and populations can be more or less readily grouped.

144. **Definition of 'threatened ecological community'**: An ecological community which is likely to become extinct in nature if the circumstances and factors threatening its extent, survival or evolutionary development continue to operate.

145. Guidelines for a threatened ecological community are that the community is subject to current and continuing threats likely to lead to extinction as demonstrated by one or more of the following phenomena:

    i) Marked decrease in geographic distribution. A marked decrease in distribution is considered to be a measurable change whereby the distribution of the ecological community has contracted to less than 10% of its former range, or the total area of the ecological community is less than 10% of its former area, or where less than 10% of the area of the ecological community is in patches of a size sufficiently large for them to be likely to persist for more than 25 years. (The figure of 10% is indicative only and for some communities, especially those which originally covered a relatively large area, it may be appropriate to use a different figure).

    ii) Marked alteration of community structure. Community structure includes the identity and number of component species that make up an ecological community, the relative and absolute abundance of those species and the number, type and strength of biotic and abiotic processes that operate within the community. A marked alteration of community structure is a measurable change whereby component species abundance, abiotic interactions, or biotic interactions are altered to the extent that rehabilitation of the ecological community is unlikely to occur within 25 years.

    iii) Loss or decline of native species that are believed to play a major role in the community. This guideline refers to species that are important structural components of a community or are important in the processes that sustain or play a major role in the community, e.g., seagrass, bivalve (shellfish) reefs, termite nests, kelp, or dominant tree species.

    iv) Restricted geographic distribution (determined at national level) such that the community could be lost rapidly by the action of a threatening process.

    v) Community processes being altered to the extent that a marked alteration of community structure will occur. Community processes can be abiotic (e.g., fire, flooding, altered hydrology, salinity, nutrient change) or biotic (e.g., pollinators, seed dispersers, soil disturbance by vertebrates which affect plant germination). This guideline recognizes that ecological processes are important to maintain an ecological community, e.g., fire regimes, flooding, cyclone damage, and that disruption to those processes can lead to the decline of the ecological community.

146. Definitions of **'**globally threatened species', 'importance', and 'species' are also given in Appendix G.

Where to go for further help or information

147. Information on species status is available from IUCN, CITES and CMS as follows:

	Web-link
IUCN Red List	www.iucnredlist.org
CITES Appendices	www.cites.org/eng/resources/species.html
CMS Appendices	www.cms.int/documents/appendix/cms_app1_2.htm

Information on waterbird flyways and their definition is given by Boere & Stroud (2006) and Hagemeijer (2006).

148. Guidance on identifying Important Plant Areas is given by Anderson (2002, 2005) for Europe, and Plantlife International (2004) more widely.

6.1.3 Criterion 3

A wetland should be considered internationally important if it supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region.

What this Criterion is seeking to achieve

149. Criterion 3 identifies wetlands that are important in maintaining the characteristic biological diversity of a particular biogeographic region through support of regionally typical species or habitats.

How to interpret this Criterion – what it means

150. The interpretation of this Criterion must consider the significance of the wetland for biodiversity support within its wider regional context. It should particularly consider the role of the site as a 'source' of wetland dependent species dispersing to surrounding areas as well as its significance in the definition and maintenance of characteristic regional biodiversity.

151. Although not necessarily required, the Criterion can typically be used to recognize the importance of large-scale wetlands extending across landscapes (or of broad coastal/inshore waters). These large-scale sites define regional biodiversity. Examples include the blanket peatlands of Caithness and Sutherland (UK), the diverse tropical wetlands of the Okavango Delta (Botswana), and the Ngiri-Tumba-Maindombe wetlands (Democratic Republic of Congo).

152. When Contracting Parties are reviewing candidate sites for listing under this Criterion, greatest conservation value will be achieved through the selection of a suite of sites that have the following characteristics. They:

i) are "hotspots" of biological diversity and are evidently species-rich even though the number of species present may not be accurately known; and/or
ii) are centres of endemism or otherwise contain significant numbers of endemic species; and/or
iii) contain the range of biological diversity (including habitat types) occurring in a region; and/or
iv) contain a significant proportion of wetland dependent species adapted to special environmental conditions (such as temporary wetlands in semi-arid or arid areas); and/or
v) support particular elements of biological diversity that are rare or particularly characteristic of the biogeographic region.

153. Notwithstanding that small absolute numbers of individuals or sites may be involved, or that only poor quality quantitative data or information may be available, particular consideration should be given to using this Criterion for listing wetlands that support globally threatened communities or species at any stage of their life cycle.

What data and information are needed to apply this Criterion?

154. The following minimum information is needed to apply this Criterion:

- an inventory of plant and/or animal species present at the site;
- a broad understanding of the elements which define the characteristic plant and animal diversity of the biogeographic region in which the wetland occurs; and
- a broad understanding of the significance of the specific wetland in the context of the wider regional biodiversity assessment.

Potential ambiguities and pitfalls

155. See section 5.7.4 for guidance on species nomenclature and taxonomy.

156. See section 5.3 for guidance on biogeographic regionalizations.

157. Be aware also of the biological importance of many karst and other subterranean hydrological systems (see specific guidance in Appendix E1).

More detail

158. **Definition of 'populations':** In the context of Criterion 3, this means the population of a species within the specified biogeographical region.

159. **Definition of 'biogeographic region'**: - See definition in section 5.3.

Where to go for further help or information?

160. Conserving hotspots of endemism is particularly important in the context of Criterion 3. Information on centres of endemism for a number of taxa is readily available; for example, Appendix II of Langhammer et al. (2007) lists many online sources of relevant data and information. These include:

- *Centres of Plant Diversity: a guide and strategy for their conservation* (WWF & IUCN 1994-1997)
- BirdLife International's Endemic Bird Areas of the World (Stattersfield *et al.* 1998) and other data available at www.birdlife.org/datazone;
- Alliance for Zero Extinction (AZE) sites (www.zeroextinction.org);
- Biodiversity Hotspots species database (www.biodiversityhotspots.org); and
- Global Amphibian Assessment (www.globalamphibians.org).

161. Guidance on identifying Important Plant Areas is given by Anderson (2002, 2005) for Europe, and Plantlife International (2004) more widely.

6.1.4 Criterion 4

A wetland should be considered internationally important if it supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions.

What this Criterion is seeking to achieve

162. This Criterion identifies those wetlands that are critically important in enabling plant and/or animal species to fulfil life cycles by providing necessary ecological support (for example, essential food resources) on a basis that is either regular and annual or is more infrequent though nonetheless predictable.

How to interpret this Criterion – what it means

163. All aspects of the environment provide support or refuge to those plants and animals that live within it. A test of 'international importance' needs to be applied in the application of this Criterion. Thus, its use typically (though not necessarily always) occurs in conjunction with one or more of Ramsar's other Criteria.

164. The life-cycle support, or refuge, being acknowledged by the application of this Criterion should thus apply to internationally important (or nearly internationally important) numbers of a species (Criteria 5, 6, 7 or 9) and/or to species or communities that are important by virtue of their presence or rarity (Criteria 2, 3 or 8). Some examples of the possible application of the Criteria are given below.

165. The Criterion can especially be used to identify sites whose loss would be critical in the context of the life-cycle of the species occurring there.

What data and information are needed to apply this Criterion?

166. The following minimum information is needed to apply this Criterion:

- an inventory of plant and/or animal species present at the site;
- knowledge of the ecological functions (either seasonally or periodically) provided by the site for the species present (e.g., food resources, physical shelter, etc.); and
- a broad understanding of the significance of the ecological support functions of the site in the context of the overall life-cycle of the species concerned (for example, that the site is an important staging area for specified migratory species).

Potential ambiguities and pitfalls

167. The main pitfall of interpretation relates to ensuring that, in its application, sites selected are of international importance for either types of species (e.g., rarity) or numbers of species (e.g., population sizes). It is thus recommended that the Criterion be applied in association with one or more other Criteria (although this is not formally required).

168. See section 5.7.4 for guidance on species nomenclature and taxonomy.

More detail

169. This Criterion may be applied in these circumstances:

    i) Critical sites for mobile or migratory species are those which contain particularly high proportions of populations gathered in relatively small areas at particular stages of life cycles. This may be at particular times of the year or, in semi-arid or arid areas, during years with a particular rainfall pattern. For example, many waterbirds use relatively small areas as key staging points (to eat and rest) on their long-distance migrations between breeding and non-breeding areas. For Anatidae species, moulting sites are also critical. Sites in semi-arid or arid areas may hold very important concentrations of waterbirds and other mobile wetland species and be crucial to the survival of populations, yet may vary greatly in apparent importance from year to year as a consequence of considerable variability in rainfall patterns.

    ii) Non-migratory wetland species are unable to move away when climatic or other conditions become unfavourable and only some sites may feature the special ecological characteristics to sustain species' populations in the medium or long term. Thus in dry periods, some crocodile and fish species retreat to deeper areas or pools within wetland complexes, as the extent of suitable aquatic habitat diminishes. These restricted areas are critical for the survival of animals at that site until rains come and increase the extent of wetland habitat once more. Sites (often with complex ecological, geomorphological and physical structures) which perform such functions for non-migratory species are especially important for the persistence of populations and should be considered as priority candidates for designation.

170. Information on the role of wetlands as refuges or otherwise in their support of species during climatically adverse conditions will become increasingly important as the global climate changes.

171. **Definition of 'adverse conditions':** Ecological conditions unusually hostile to the survival of plant or animal species, such as occur during severe weather like prolonged drought, flooding, cold, etc.

172. **Definition of 'critical stage':** Critical stages of the life cycle of wetland-dependent species are those in which occur those activities (breeding, migration stopovers, etc.) which, if interrupted or prevented from occurring, may threaten long-term conservation of the species. For some species (Anatidae – ducks, geese and swans – for example), areas where moulting occurs are vitally important.

173. **Definition of 'provides refuge':** Refer also to the definition for 'critical stage', which is related. Refuges should be interpreted to mean those locations where such critical stages gain some degree of protection during adverse condition such as drought.

Where to go for further help or information

174. Ridgill & Fox (1990) reviewed the movements of waterbirds in periods of extreme cold weather and identified European wetlands that are periodically of critical importance as refuges. That work is a good example of a regional scale analysis valuable in informing understanding of site criticality to mobile species during periodic adverse conditions.

175. Information on life cycles and influencing factors for all bird species is available at www.birdlife.org/datazone/. For all IUCN Red-listed species, information is available at www.iucnredlist.org/.

Specific criteria based on waterbirds

6.1.5 Criterion 5

A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds.

What this Criterion is seeking to achieve

176. This Criterion identifies those wetlands which are of numerical importance for waterbirds through their support of internationally important numbers, either of one or more species, and often the total numbers of the waterbird species assemblage.

177. When Contracting Parties are reviewing candidate sites for listing under this Criterion, greatest conservation value will be achieved through the selection of a network of sites that provide habitat for waterbird assemblages containing globally threatened species or subspecies. These are currently poorly represented in the Ramsar List. (Refer also to paragraph 86 above, "Species presence in perspective".)

How to interpret this Criterion – what it means

178. The Criterion is unambiguous and has been widely applied throughout the world. The Criterion can be applied only when regular waterbird count information is available for the site being designated. Also see below (and Appendix G) for the definition of 'regularly' as in 'regularly supports 20,000 or more waterbirds' in applying this Criterion.

What data and information are needed to apply this Criterion?

179. This Criterion can be simply applied using data from regular counts of waterbirds at a site. Typically data from national level waterbird monitoring schemes and the International Waterbird Census collated by Wetlands International are the key reference sources, although other site-specific survey data may also be used where it exists. Contact Wetlands International for details of availability of relevant data (see below).

Potential ambiguities and pitfalls

180. In completing the RIS, indicate the actual total number of waterbirds present, and preferably, when available, the average total number from several recent years. It is not sufficient simply to restate the Criterion, i.e., that the site supports >20,000 waterbirds.

181. **Non-native waterbirds** should not be included within the totals for a particular site (refer also to section 5.7.3 above, "Non-native species").

182. Where a site being designated is only part of a wetland or wetland complex, it is important that the waterbird counts used must be from within only that part of the site being designated, and not from a broader wetland area.

183. Criterion 5 should be applied not only to multi-species assemblages, but also to sites regularly holding more than 20,000 waterbirds of any one species. For populations of waterbirds of more than 2,000,000 individuals, a 1% threshold of 20,000 is adopted on the basis that sites holding this number are of importance under Criterion 5. To reflect the importance of the site for the species concerned, it is also appropriate to list such a site under Criterion 6.

184. See section 5.7.4 for guidance on species nomenclature and taxonomy.

More detail

185. **Definition of 'waterfowl':** The Convention functionally defines waterfowl (a term which, for the purposes of these Criteria and Guidelines, is considered to be synonymous with "waterbirds") as "birds ecologically dependent on wetlands" (Article 1.2). This definition thus includes any wetland bird species. However, at the broad level of taxonomic order, it includes especially:

- penguins: *Sphenisciformes*.
- divers: *Gaviiformes*;
- grebes: *Podicipediformes*;
- wetland related pelicans, cormorants, darters and allies: *Pelecaniformes*;
- herons, bitterns, storks, ibises and spoonbills: *Ciconiiformes*;
- flamingos: *Phoenicopteriformes*:
- screamers, swans, geese and ducks (wildfowl): *Anseriformes*;
- wetland related raptors: *Accipitriformes* and *Falconiformes*;
- wetland related cranes, rails and allies: *Gruiformes*;
- Hoatzin: *Opisthocomiformes*;
- wetland related jacanas, waders (or shorebirds), gulls, skimmers and terns: *Charadriiformes;*
- coucals*: Cuculiformes;* and
- wetland related owls: *Strigiformes*.

186. **Definition of 'regularly'** (Criteria 5 & 6): As in 'supports regularly'. A wetland regularly supports a population of a given size if:

i) the requisite number of birds is known to have occurred in two thirds of the seasons for which adequate data are available, the total number of seasons being not less than three; or

ii) the mean of the maxima of those seasons in which the site is internationally important, taken over at least five years, amounts to the required level (means based on three or four years may be quoted in provisional assessments only).

187. In establishing long-term 'use' of a site by birds, natural variability in population levels should be considered especially in relation to the ecological needs of the populations present. Thus in some situations (e.g., sites of importance as drought or cold weather refuges or temporary wetlands in semi-arid or arid areas – which may be quite variable in extent between years), the simple arithmetical average number of birds using a site over several years may not adequately reflect the true ecological importance of the site. In these instances, a site may be of crucial importance at certain times ('ecological bottlenecks'), but hold lesser numbers at other times. In such situations, there is a need for interpretation of data from an appropriate time period in order to ensure that the importance of sites is accurately assessed.

188. In some instances, however, for species occurring in very remote areas or which are particularly rare, or where there are particular constraints on national capacity to undertake surveys, areas may be considered suitable on the basis of fewer counts. For some countries or sites where there is very little information, single counts can help establish the relative importance of the site for a species.

189. **Turnover** of individuals, especially during migration periods, leads to more waterbirds using particular wetlands than are counted at any one point in time, such that the importance of such a wetland for supporting waterbird populations will often be greater than is apparent from simple census information. See Appendix G for the definition of the term 'turnover'. The following considerations in relation to 'turnover' in the application of Criterion 5 apply:

i) Accurate estimation of turnover and total number of individuals of a population or populations using a wetland is difficult, and several methods (e.g., cohort marking and resighting, or summing increases in a count time-series) which have sometimes been applied do not yield statistically reliable or accurate estimates.

ii) The only currently available method that is considered to provide reliable estimates of turnover is that of unique capture/marking and resighting/recapture of individually-marked birds in a population at a migratory staging site. But it is important to recognize that for this method to generate a reliable estimate of migration volume, its application usually requires significant capacity and resources, and for large and/or inaccessible staging areas (especially where birds in a population are widely dispersed) use of this method can present insuperable practical difficulties.

iii) When turnover is known to occur in a wetland but it is not possible to acquire accurate information on migration volume, Parties should continue to consider recognizing the importance of the wetland as a migratory staging area through the

application of Criterion 4 as the basis for ensuring that their management planning for the site fully recognizes this importance.

190. **Size of sites.** This Criterion will apply to wetlands of varying size in different Contracting Parties. While it is impossible to give precise guidance on the size of an area in which these numbers may occur, wetlands identified as being of international importance under Criterion 5 should form an ecological unit, and may thus be made up of one big area or a group of smaller wetlands. Refer also to section 5.8 above, "Wetlands in the landscape: connectivity and site clusters".

Where to go for further help or information

191. International Waterbird Census: Wetlands International, http://tinyurl.com/323yycf.

6.1.6 Criterion 6

A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird.

What this Criterion is seeking to achieve

192. This Criterion identifies wetlands of numerical importance for waterbirds through their support of a significant proportion of specific biogeographic populations (more than 1%), noting that in most cases the biogeographic range of waterbird populations is larger than the territory of one Contracting Party.

193. When Contracting Parties are reviewing candidate sites for listing under this Criterion, greatest conservation value will be achieved through the selection of a suite of sites that hold populations of globally threatened species or subspecies. Refer also to paragraph 86 above, "Species presence in perspective", and section 5.5, "Legal status and complementary conservation frameworks". Consideration may also be given to turnover of waterbirds at migration periods, so that a cumulative total is reached, if such data are available (see paragraph 189 above).

How to interpret this Criterion – what it means

194. The Criterion is unambiguous and has been widely applied throughout the world. The term 'population' in this Criterion refers to the relevant biogeographic population, as defined below. For each population listed under Criterion 6, the name of the biogeographic population, as well as the number of birds of this population regularly occurring in the site, should be listed.

What data and information are needed to apply this Criterion?

195. This Criterion can be simply applied with just two elements of information, but both these elements are essential for its application:

i) a count of the total number of the waterbirds of a particular population of a species or subspecies using the wetland; and
ii) 1% threshold from the current estimate of the size of the relevant biogeographic population of the waterbird concerned.

196. Site-related population data are available for many wetlands from the International Waterbird Census (IWC) of Wetlands International, from national waterbird monitoring schemes contributing to the IWC, or indeed from specific surveys undertaken at the site concerned. Contact Wetlands International for details of availability of relevant data held by the IWC (see below).

197. Current estimates of the sizes of all waterbird species' populations and 1% thresholds for those populations for which there is a reliable population size estimate are also available in Wetland International's periodic publication *Waterbird Population Estimates*, available in the Waterbird Populations Portal. If this Criterion is being applied to a waterbird species or population which is either not covered in *Waterbird Population Estimates*, or for which that publication does not provide a 1% threshold or the threshold provided is considered to be out of date, an alternative source of the population size estimate may be used and details of the source must be provided, both to the Secretariat and to Wetlands International (to maintain a log of such instances). In doing so, details of the methodology for the estimate, which should be well-founded, are to be provided.[7]

Potential ambiguities and pitfalls

198. In completing the RIS, indicate the actual total number of waterbirds present, and preferably, when available, the average total number from several recent years, and the percentage this represents of the population size of the relevant biogeographic population. It is not sufficient simply to restate the Criterion, i.e., that the site supports >1% of a biogeographic population.

199. **Non-native waterbirds** are not applicable under this Criterion (refer also to section 5.7.3 above, "Non-native species").

200. Where a site being designated is only part of a wetland or wetland complex, it is important that the waterbird counts used must be from within only that part of the site being designated, and not from a broader wetland area.

201. **Mixed populations**. At some sites, more than one biogeographical population of the same species can occur, especially during migration periods and/or where flyway systems of different populations intersect at major wetlands. Where such populations are indistinguishable in the field, as is usually the case, this can present practical problems as to which 1% threshold to apply. Where such mixed populations occur (and these are inseparable in the field), it is suggested that the larger 1% threshold be used in the evaluation of sites.

202. However, particularly where one of the populations concerned is of high conservation status, this guidance should be applied flexibly and Parties should consider recognizing the

[7] Updated by Resolution XIV.18 on *Waterbird population estimates to support new and existing Ramsar Site designations under Ramsar Criterion 6 – use of alternative estimates* (2022).

overall importance of the wetland for both populations through the application of Criterion 4, as the basis for ensuring that their management planning for the site fully recognizes this importance. This guidance should not be applied to the detriment of smaller, high conservation status populations.

203. Note that this guidance applies just during the period of population mixing (which is often, but not exclusively, during periods of migration). At other times, it is generally possible to assign a 1% threshold accurately to the single population that is present.

204. See section 5.7.4 for guidance on species nomenclature and taxonomy.

More detail

205. **Biogeographical population.** Several types of 'populations' are recognized:

i) the entire population of a monotypic species;
ii) the entire population of a recognized subspecies;
iii) a discrete migratory population of a species or subspecies, i.e., a population which rarely if ever mixes with other populations of the same species or subspecies;
iv) that 'population' of birds from one hemisphere which spends the non-breeding season in a relatively discrete portion of another hemisphere or region. In many cases, these 'populations' may mix extensively with other populations on the breeding grounds or mix with sedentary populations of the same species during the migration seasons and/or on the non-breeding grounds;
v) a regional group of sedentary, nomadic or dispersive birds with an apparently rather continuous distribution and no major gaps between breeding units sufficient to prohibit interchange of individuals during their normal nomadic wanderings and/or post-breeding dispersal.

206. **Waterbird population size.** To ensure international comparability, Contracting Parties should use the international population estimates and 1% thresholds published and updated approximately every three years by Wetlands International as the basis for evaluating sites for the List using this Criterion. Most recent 1% thresholds are given in *Waterbird Population Estimates,* 4th Edition (2006), which also provides a description of the biogeographic range of each population. Earlier editions of *Waterbird Population Estimates* are now superseded and should not be used for Criterion 6 application.

207. Note that this Criterion should be applied only to those waterbird populations for which a 1% threshold is available. However, for populations of waterbird species in taxa not presently covered by *Waterbird Population Estimates,* this Criterion may be applied if a reliable population estimate and 1% threshold is available from another source and if that information source is clearly specified. It is not sufficient simply to restate the Criterion, that the site supports >1% of a population, nor is it a correct justification to list populations with numbers in the site >1% of their *national* population, except when the population is endemic to that country.

207(a). An alternative source may also be used where population estimates published in the current *Waterbird Population Estimates* are considered to be out of date.[8]

208. As urged by Resolutions VI.4 (1996) and VIII.38 (2002) for the better application of this Criterion, Contracting Parties should not only supply data for the future update and revision of international waterbird population estimates, but should also support the national implementation and development of Wetlands International's International Waterbird Census, which is the source of many of these data.

209. **Turnover** of individuals, especially during migration periods, leads to more waterbirds using particular wetlands than are counted at any one point in time, such that the importance of such a wetland for supporting waterbird populations will often be greater than is apparent from simple census information. For further guidance on estimation of turnover, see the guidance above under Criterion 5, paragraph 189.

Where to go for further help or information?

210. International Waterbird Census: Wetlands International, https://www.wetlands.org/IWC and the publication *Waterbird Population Estimates* available through the Waterbird Populations Portal https://wpp.wetlands.org/.[9]

211. Further detailed information on the distribution and range of biogeographic populations of some groups of waterbirds are available as follows:

Waterbird taxa	Geographical area	Source of information
Anatidae	Africa and western Eurasia	Scott & Rose (1996)
Anatidae	Eastern Eurasia	Miyabayashi & Mundkur (1999)
Waders	Africa and western Eurasia	Delany *et al.* (2009)

Specific criteria based on fish

6.1.7 Criterion 7

A wetland should be considered internationally important if it supports a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contributes to global biological diversity.

What this Criterion is seeking to achieve

212. Fishes are the most diverse and abundant vertebrates associated with wetlands. Worldwide, it is estimated that over 18,000 species of fishes are resident for all or part of their life cycles in wetlands.

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[8] Added in accordance with Resolution XIV.18 on *Waterbird population estimates to support new and existing Ramsar Site designations under Ramsar Criterion 6 – use of alternative estimates* (2022).

[9] Updated by Resolution XIV.18 on *Waterbird population estimates to support new and existing Ramsar Site designations under Ramsar Criterion 6 – use of alternative estimates* (2022).

213. Criterion 7 identifies those wetlands important to the maintenance of biodiversity through their support of fish species (which include shellfishes). It emphasizes the different forms that diversity might take, including the number of taxa, different life-history stages, species interactions, and the complexity of interactions between the above taxa and the external environment. In addition, the different ecological roles that species may play at different stages in their life cycles needs to be considered.

How to interpret this Criterion – what it means

214. Criterion 7 has a very complex formulation. It can best be interpreted as:

'A wetland should be considered internationally important if it supports a significant proportion of:
indigenous fish subspecies, species or families;
and/or life-history stages [of fish];
and/or species interactions;
and which are characteristic of a biogeographical region.'

215. The Criterion sets out a number of categories of assessment (indigenous species, life history stages, etc.) and states that a 'significant proportion' of these should be present. Elaboration of what is a 'significant proportion' is given in the definitions below. Assessment of significant proportionality should ideally be undertaken on the scale of the appropriate biogeographic region.

What data and information are needed to apply this Criterion?

216. The following information is needed *ideally* to apply this Criterion. However, it may be applied even with partial information:

- an inventory of the species (and ideally subspecies) of fish present at the wetland (and from which can be derived a list of the fish families present);
- knowledge of the extent to which fish subspecies, species or families are indigenous to the wetland concerned (within the context of a biogeographic region);
- an understanding of the life history stages of fish present at the site;
- an understanding of the interactions between fish present at the site; and
- contextual information about fish to enable attributes of the site to be placed in a regional context.

Potential ambiguities and pitfalls

217. A species list alone is not sufficient justification for the use of this Criterion, and information on other measures of diversity, including life-history stages, species interactions, and level of endemism is required.

218. See section 5.7.4 for guidance on species nomenclature and taxonomy.

More detail

219. The Criteria refers directly to the contribution of sites important to fish in terms of global biodiversity. Implicit in this understanding of biological diversity is the importance of high levels of endemism. Many wetlands are characterized by the highly endemic nature of their fish fauna.

220. Some measure of **the level of endemism** should be used to distinguish sites of international importance. If at least 10% of fish are endemic to a wetland or to wetlands in a natural grouping, that site should be recognized as internationally important, but the absence of endemic fishes from a site should not disqualify it if it has other qualifying characteristics. In some wetlands, such as the African Great Lakes, Lake Baikal in the Russian Federation, Lake Titicaca in Bolivia/Peru, sinkholes and cave lakes in arid regions, and lakes on islands, endemism levels as high as 90-100% may be reached, but 10% is a practical figure for worldwide application. In areas with no endemic fish species, the endemism of genetically-distinct infraspecific categories, such as geographical races, should be used.

221. According to the 2006 IUCN Red List, 1,173 species of fish are globally threatened and 93 species are extinct or extinct in the wild. The occurrence of rare or threatened fish is also included within the scope of Criterion 2.

222. **Definition of 'supports':** Provides habitat for; areas which can be shown to be important to a species or an assemblage of species for any period of time are said to support that species. Occupation of an area need not be continuous, but may be dependent on natural phenomena such as flooding or (local) drought conditions.

223. **Definition of 'significant proportion'** (Criteria 7 and 8): In polar biogeographical regions a "significant proportion" may be 3-8 subspecies, species, families, life-history stages or species interactions; in temperate zones 15-20 subspecies, species, families, etc.; and in tropical areas 40 or more subspecies, species, families, etc., but these figures will vary among regions.

- A "significant proportion" of species includes all species and is not limited to those of economic interest.
- Some wetlands with a "significant proportion" of species may be marginal habitats for fish and may only contain a few fish species, even in tropical areas, e.g., the backwaters of mangrove swamps, cave lakes, the highly saline marginal pools of the Dead Sea.
- The potential of a degraded wetland to support a "significant proportion" of species if it were to be restored also needs to be taken into account. In areas where fish diversity is naturally low, e.g., at high latitudes, in recently glaciated areas or in marginal fish habitats, genetically distinct infraspecific groups of fishes could also be counted.

224. **Definition of 'species interaction'**: Exchanges of information or energy between species that are of particular interest or significance, e.g., symbiosis, commensalism, mutual resource defence, communal brooding, cuckoo behaviour, advanced parental care, social hunting, unusual predator-prey relationships, parasitism and hyperparasitism. Species interactions occur in all ecosystems but are particularly developed in species-rich climax

communities, such as coral reefs and ancient lakes, where they are an important component of biological diversity.

225. **Definition of 'biological diversity'**: 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 (genetic diversity), between species (species diversity), of ecosystems (ecosystem diversity), and of ecological processes. (This definition is largely based on the one contained in Article 2 of the Convention on Biological Diversity.)

226. **Definition of 'endemic species':** A species that is unique to one biogeographical region, i.e., it is found nowhere else in the world. A group of fishes may be indigenous to a subcontinent with some species endemic to a part of that subcontinent.

227. **Definition of 'indigenous species'**: A species that originates and occurs naturally in a particular country.

228. **Definition of 'family':** An assemblage of genera and species that have a common phylogenetic origin, e.g., pilchards, sardines and herrings in the family *Clupeidae*

229. **Definition of 'fish'**: Any finfish, including jawless fishes (hagfishes and lampreys), cartilaginous fishes (sharks, rays, skates and their allies, *Chondrichthyes*) and bony fishes (*Osteichthyes*), as well as certain shellfish or other aquatic invertebrates (see below).

230. **Definition of 'life-history stage':** A stage in the development of a finfish or shellfish, e.g., egg, embryo, larva, leptocephalus, zoea, zooplankton stage, juvenile, adult, or post-adult.

231. **Definition of 'population':** In this case, a group of fishes comprising members of the same species.

232. **Definition of 'wetland benefits':** The services that wetlands provide to people, e.g., flood control, surface water purification, supplies of potable water, fishes, plants, building materials and water for livestock, outdoor recreation and education. See also Resolution VI.1.

233. **Definition of 'wetland values':** The roles that wetlands play in natural ecosystem functioning, e.g, flood attenuation and control, maintenance of underground and surface water supplies, sediment trapping, erosion control, pollution abatement and provision of habitat.

Where to go for further help or information

234. Useful sources of online data and information on fish include:

- **A Catalog of the Species of Fishes** (http://research.calacademy.org/ichthyology/catalog)
- **Fishbase** (www.fishbase.org/home.htm)

- **Inter-Institutional Database of Fish Biodiversity in theNeotropics** (NEODAT) (www.neodat.org/)
- **ReefBase** (www.reefbase.org)

6.1.8 Criterion 8

A wetland should be considered internationally important if it is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.

What this Criterion is seeking to achieve

235. Criterion 8 identifies those wetlands which support internationally important fish stocks (including bivalves/shellfish) through aspects of their ecological functioning. This includes via the role of the wetland in providing food and/or as a spawning ground, a nursery area, or a migration path.

How to interpret this Criterion – what it means

236. The emphasis of this Criterion is not on the fish themselves (the subject of Criterion 7) but rather on the ecological functions provided by the wetland, notably as a source of food, or as a spawning ground or nursery, or as a migration path. The Criterion notes that the importance of these functions need not just be for fish within the wetland itself but may also be for fish stocks further afield. For example, many coastal wetlands such as estuaries or mangrove swamps are crucially important as nursery areas for fish stocks living in deeper waters offshore.

237. Many wetlands support functions for fish stocks. An assessment of overall significance is relevant in determining whether or not these functions are of *international* importance. The following attributes are likely to be associated with a wetland that is internationally important under Criterion 8. These include functions that support fish stocks:

- across extensive areas or multiple wetlands;
- across national borders;
- of multiple species (including, but not restricted to those that are of high conservation status and/or are endemic within a biogeographic region); and/or
- which further support significant ecosystem services related to fish.

238. The guidance for Criterion 8 does not interfere with the rights of Contracting Parties to regulate fisheries within specific wetlands and/or elsewhere.

What data and information are needed to apply this Criterion?

239. The following information is *ideally* needed to apply this Criterion, but it may be applied even with partial information:

i) Site-related data on the role of the site in supporting fish populations either through provision of food or in providing supporting functions such as a spawning and/or nursery area or migration path.

ii) The context and significance of functions of the site for fish populations at wider scales (nationally or internationally).

Potential ambiguities and pitfalls

240. Note that the emphasis of this Criterion is not on the fish themselves (the subject of Criterion 7) but rather on the ecological functions provided by the wetland, notably as a source of food, or as a spawning ground or nursery, or as a migration path (see above).

241. In applying this Criterion, give special consideration to assessing whether the features of the site are of *international* importance, as described in paragraph 237 above.

More detail

242. Many fishes (including shellfishes) have complex life histories, with spawning, nursery and feeding grounds widely separated and long migrations necessary between them. It is important to conserve all those areas that are essential for the completion of a fish's life cycle if the fish species or stock is to be maintained. The productive, shallow habitats offered by coastal wetlands (including coastal lagoons, estuaries, saltmarshes, inshore rocky reefs, and sandy slopes) are extensively used as feeding and spawning grounds and nurseries by fishes with adult stages in open water. These wetlands therefore support essential ecological processes for fish stocks, even if they do not necessarily harbour large adult fish populations themselves.

243. Furthermore, many fishes in rivers, swamps or lakes spawn in one part of the ecosystem but spend their adult lives in other inland waters or in the sea. It is common for fishes in lakes to migrate up rivers to spawn, and for fishes in rivers to migrate downstream to a lake or estuary, or beyond the estuary to the sea, to spawn. Many swamp fishes migrate from deeper, more permanent waters to shallow, temporarily inundated areas for spawning. Wetlands, even apparently insignificant ones in one part of a river system, may therefore be vital for the proper functioning of extensive river reaches up- or downstream of the wetland.

244. **Definition of 'fishes':** 'Fishes' is used as the plural of 'fish' when more than one species is involved. Fish orders that typically inhabit wetlands (as defined by the Ramsar Convention) and which are indicative of wetland benefits, values, productivity or biological diversity, include:

i) **Jawless fishes - *Agnatha***
- hagfishes (*Myxiniformes*)
- lampreys (*Petromyzontiformes*)

ii) **Cartilaginous fishes - *Chondrichthyes***
- dogfishes, sharks and allies (*Squaliformes*)
- skates (*Rajiformes*)

- stingrays and allies (*Myliobatiformes*)

iii) **Bony fishes - *Osteichthyes***

- Australian lungfish (*Ceratodontiformes*)
- South American and African lungfishes (*Lepidosireniformes*)
- bichirs (*Polypteriformes*)
- sturgeons and allies (*Acipenseriformes*)
- gars (*Lepisosteiformes*)
- bowfins (*Amiiformes*)
- bonytongues, elephant fishes and allies (*Osteoglossiformes*)
- tarpons, bonefishes and allies (*Elopiformes*)
- eels (*Anguilliformes*)
- pilchards, sardines and herrings (*Clupeiformes*)
- milkfishes (*Gonorhynchiformes*)
- carps, minnows and allies (*Cypriniformes*)
- characins and allies (*Characiformes*)
- catfishes and knifefishes (*Siluriformes*)
- pikes, smelts, salmons and allies (*Salmoniformes*)
- mullets (*Mugiliformes*)
- silversides (*Atheriniformes*)
- halfbeaks (*Beloniformes*)
- killifishes and allies (*Cyprinodontiformes*)
- sticklebacks and allies (*Gasterosteiformes*)
- pipefishes and allies (*Syngnathiformes*)
- cichlids, perches and allies (*Perciformes*)
- flatfishes (*Pleuronectiformes*)

iv) **Several groups of shellfishes:**

- shrimps, lobsters, freshwater crayfishes, prawns and crabs (*Crustacea*)
- mussels, oysters, pencil baits, razor shells, limpets, winkles, whelks, scallops, cockles, clams,
- abalone, octopus, squid and cuttlefish (*Mollusca*)

v) **Certain other aquatic invertebrates:**

- sponges (*Porifera*)
- hard corals (*Cnidaria*)
- lugworms and ragworms (*Annelida*)
- sea urchins and sea cucumbers (*Echinodermata*)
- sea squirts (*Ascidiacea*)

245. **Definition of 'fish stock':** The potentially exploitable component of a fish population.

246. **Definition of 'spawning ground':** That part of a wetland used by fishes for courting, mating, gamete release, gamete fertilization and/or the release of the fertilized eggs, e.g., herring, shad, flounder, cockles, and many fishes in freshwater wetlands. The spawning

ground may be part of a river course, a stream bed, inshore or deep water zone of a lake, floodplain, mangrove, saltmarsh, reed bed, estuary or the shallow edge of the sea. The freshwater outflow from a river may provide suitable spawning conditions on the adjacent marine coast.

247. **Definition of 'migration path':** The route along which fishes, such as salmon and eels, swim when moving to or from a spawning or feeding ground or nursery. Migration paths often cross international boundaries or boundaries between management zones within a country.

248. **Definition of 'nursery':** That part of a wetland used by fishes for providing shelter, oxygen and food for the early developmental stages of their young. In some fishes, e.g., nest-guarding tilapias, the parent/s remain at the nursery to protect the young whereas in others the young are not protected by the parent/s except by virtue of the shelter provided by the habitat in which they are deposited, e.g., non-guarding catfishes. The ability of wetlands to act as nurseries depends on the extent to which their natural cycles of inundation, tidal exchange, water temperature fluctuation and/or nutrient pulses are retained. Welcomme (1979) showed that 92% of the variation in catch from a wetland-recruited fishery could be explained by the recent flood history of the wetland.

Where to go for further help or information

249. Useful sources of online data and information on fish are given under Criterion 7.

Specific Criterion based on other taxa

6.1.9 Criterion 9

A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of wetland-dependent non-avian animal species.

What this Criterion is seeking to achieve

250. This Criterion identifies wetlands of numerical importance for non-avian wetland dependent animals through their support of a significant proportion of specific biogeographic populations (more than 1%), noting that in most cases the biogeographic range of such populations is larger than the territory of one Contracting Party.

How to interpret this Criterion – what it means

251. When Contracting Parties are reviewing candidate sites for listing under this Criterion, greatest conservation value will be achieved through the selection of a suite of sites that hold populations of globally threatened species or subspecies.

252. Refer also to paragraph 86 above, "Species presence in perspective", and section 5.5 above, "Legal status and complementary conservation frameworks". Consideration may also be given to turnover of waterbirds at migration periods, so that a cumulative total is

reached, if such data are available (comments on turnover in paragraph 189 related to waterbirds are also applicable in relation to non-avian animals).

253. To ensure international comparability, wherever possible Contracting Parties should use the most current international population estimates and 1% thresholds provided and regularly updated by IUCN's Specialist Groups though the IUCN Species Information Service (SIS) and being published in the Ramsar Technical Report series, as the basis for evaluating sites for the List using this Criterion. (Note: An initial listing is provided in the paper *Population estimates and 1% thresholds for wetland-dependent non-avian species, for the application of Criterion 9*.)

254. This Criterion can also be applied to nationally endemic species or populations, where reliable national population size estimates exist. When making such an application of the Criterion, information concerning the published source of the population size estimate should be included in the justification for the application of this Criterion. Such information can also contribute to expanding the taxonomic coverage of the information on population estimates and 1% thresholds published in the Ramsar Technical Report series.

What data and information are needed to apply this Criterion?

255. This Criterion is applicable to populations and species in a range of non-avian taxa including, *inter alia,* mammals, reptiles, amphibians, fish and aquatic macro-invertebrates. However, only species or subspecies for which reliable population estimates have been provided and published should be included in the justification for the application of this Criterion. Where no such information exists, Contracting Parties should give consideration to designation for important non-avian animal species under Criterion 4.

256. For better application of this Criterion, Contracting Parties should assist, wherever possible, in the supply of such data to the IUCN-Species Survival Commission and its Specialist Groups in support of the future updating and revision of international population estimates.

Potential ambiguities and pitfalls

257. Note that this Criterion should be applied only to those animal populations for which a 1% threshold is available. However, for populations of species in taxa not presently covered by the paper *Population estimates and 1% thresholds for wetland-dependent non-avian species, for the application of Criterion 9,* the guidelines indicate that this Criterion may be applied if a reliable population estimate and 1% threshold is available from another source, and in such cases the information source should be clearly specified. In the application of this Criterion, it is not sufficient simply to restate the Criterion, that the site supports >1% of a population, nor is it a correct justification to list populations with numbers in the site >1% of their *national* population, except when the population is endemic to that country.

258. See section 5.7.4 for guidance on species nomenclature and taxonomy.

259. The guidance for the application of Criterion 9 for non-avian animal species is similar to that provided above for Criterion 6 for waterbirds. In particular, this Criterion must be

applied to the regular occurrence of >1% of a biogeographic population of a species or subspecies of wetland-dependent animal, and it should be recognized that in many cases the biogeographic range of the population is larger than the territory of one Contracting Party.

260. For each population listed under Criterion 9 the name of the biogeographic population, as well as the number of individuals of this population regularly occurring in the site, should be listed. An initial list of recommended 1% thresholds for the application of Criterion 9 is provided in the paper *Population estimates and 1% thresholds for wetland-dependent non-avian species, for the application of Criterion 9* (www.ramsar.org/pdf/ris/key_ris _criterion9_2006.pdf), which also provides a description of the biogeographic range of each population.

Where to go for further help or information?

261. Langhammer *et al.* (2007) lists many online sources of relevant species data and information. These include:

- **Alliance for Zero Extinction (AZE) sites:** www.zeroextinction.org
- **World Turtle Database:** http://emys.geo.orst.edu/main_pages/database.html
- **Global Amphibian Assessment:** www.amphibians.org/redlist/
- **HerpNet:** www.herpnet.org
- **Biodiversity Hotspots Vertebrate Species Database:** www.biodiversityhotspots.org/xp/Hotspots/search/Pages/search.aspx
- **Mammal Species of the World:** www.bucknell.edu/msw3/
- **Mammal Networked Information System:** http://manisnet.org/

6.2 Documenting selected Criteria in the Ramsar Site Information Sheet (RIS)

262. Each Criterion for which the proposed site qualifies should be indicated in the RIS, with accompanying information as to how that Criterion applies to the site. Part 2 of the RIS (Criteria for designation) is central to the concept of "international importance". It is essential to provide sufficiently precise descriptions to explain and support each of the Ramsar Criteria selected. This should provide the necessary details to describe the way in which a particular Criterion applies specifically at the site being designated.

7. Ramsar Site description: Guidance on describing the site at designation

7.1 The Ramsar Site Information Sheet

7.1.1 The history of the Ramsar Site Information Sheet

263. Recommendation 4.7 (1990) of the Conference of Contracting Parties established that the "data sheet developed for the description of Ramsar Sites be used by Contracting Parties and the Secretariat in presenting information for the Ramsar database, and as appropriate in other contexts". The Recommendation listed the information categories covered by the

"data sheet", including the "reasons for inclusion" (the Ramsar Criteria) and the Ramsar "Classification system for wetland type".

264. Resolution 5.3 (1993) reaffirmed that a completed "Ramsar datasheet" and site map should be provided upon designation of a Ramsar Site for the List of Wetlands of International Importance (the Ramsar List). This was subsequently reiterated in Resolutions VI.13, VI.16, and VII.12. This datasheet, formally entitled the "Information Sheet on Ramsar Wetlands" and abbreviated "RIS", provides a standardized format for recording information and data about the Ramsar Site.

265. Resolution 5.3 also stressed that information concerning criteria for inclusion on the Ramsar List, the functions and values (hydrological, biophysical, floral, faunal, social and cultural) of the site, and conservation measures taken or planned were particularly important categories of information, and it emphasized the importance of applying the "Ramsar Classification System for Wetland Type" when describing the wetland in the RIS.

266. "Criteria for Identifying Wetlands of International Importance" were first adopted by the Heiligenhafen Conference in 1974 and refined by subsequent meetings of the Conference of the Parties. The form of the present Criteria was established by Recommendation 4.2 (1990), with additional criteria based upon fish adopted by Resolution VI.2 (1996). The Criteria were again substantively revised and, together with detailed guidance for their application, adopted by Resolution VII.11 (2002) as part of the *Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance*. An additional Criterion (Criterion 9) and amendments to the guidance for the application of other Criteria were adopted by COP9 (2005) in Resolution IX.1 Annex B.

267. A review of the RIS and this Strategic Framework was requested by COP10 and brought to COP11. Key changes include:

    i) The part of the revised RIS dealing with the ecological character of the wetland being designated was changed to be consistent with the format for Ecological Character Description (as well as for baseline wetland inventory) that was approved by the Parties in Resolution X.15 (2008). This means for Parties that, prior to designation (or to updating), have made an ecological character description in line with the Resolution X.15 format, it should be straightforward to transfer the relevant data and information into the revised RIS format.

    ii) The revised formats and updated mechanisms are designed to streamline significantly the compiling, checking, and entering of data at all stages of the designation of Ramsar Sites and updating of Site information, for Contracting Parties, the Secretariat and others. They also permit greater consistency and availability of the full range of data and information contained in the RIS.

7.1.2 General guidance about Ramsar Information Sheets

268. The Ramsar Site Information Sheet (RIS) is completed and supplied to the Ramsar Secretariat when a Ramsar Site is designated by a Contracting Party. In recognition that the status of Ramsar Sites can and often does change, both in terms of their ecological character, the threats to this character, and the conservation management process and

actions underway, Resolution VI.13 (1996) urged Parties to review and update the data provided in the RIS at least every six years.

269. The RISs including their accompanying maps are held by the Ramsar Secretariat. The data and information provided by Parties in the RIS are entered into the Ramsar Sites Database, managed on behalf of the Convention by Wetlands International under contract from the Ramsar Secretariat as a core component of the Ramsar Sites Information Service (http://ramsar.wetlands.org).

270. The Database and its associated information on Ramsar Sites is managed so as to provide an information service on Ramsar Sites, including undertaking analysis and reporting to meetings of the Conference of the Parties on progress in implementing the *Strategic Framework and Vision for the List of Wetlands of International Importance* and other Resolutions of the Conferences of the Parties.

271. The information provided by Contracting Parties in the RIS, including any supplementary information provided, and held in the Ramsar Sites Database is made publicly available through the Ramsar Site Information Service website.

272. The RIS must be completed in one of the Convention's three working languages, namely English, French, or Spanish. The RIS form is available in each of those languages.

273. The information provided in the RIS should be clear and succinct and the format adopted by COP11 is designed to this effect. The overall structure and format of the RIS is shown in Box 1.

Box 1. Structure of Ramsar Information Sheet – 2012 revision

Part 0. Summary Paragraph

0. Summary description of the Ramsar Site

Part 1. Administrative and locational details

Part 1.1 About this form

1. Name and address of those responsible for compiling this form
2. Period of collection of data and information used to compile the sheet
3. Country
4. Name of Ramsar Site
5. Designation of new ramsar Site or update of information related to an existing site
6. Changes to the site since its designation or earlier update

Part 1.2 About the Site's location

7. Defining the site
8. Geographical coordinates
9. General location
10. Area of Ramsar Site
11. Biogeography

Part 2. Why is this site internationally important? (Criteria for designation)

12. Ramsar Criteria and their justification

Part 3. What is the site like? (Ecological character description)

13. What are the critical ecological components, processes and services that determine the ecological character of this Ramsar Site?

Part 3.1 Ecological components

14. Climate
15. Geomorphic setting
16. What wetland type(s) are in the site?
17. Plant species
18. Animal species
19. Soil
20. Water regime
21. Sediment regime
22. Water pH
23. Water salinity
24. Dissolved or suspended nutrients in water
25. Physical features of the surrounding area from which influences may affect the Ramsar Site

Part 3.2 Ecological processes

Part 3.3 Ecosystem services

26. Ecosystem services/benefits
27. Social or cultural values

Part 4. How is the site managed? (Conservation and management)

Part 4.1 Land tenure and responsibilities ('Managers')

28. Land tenure/ownership
29. Management authority

Part 4.2 Ecological character threats and responses ('Management')

30. Factors (actual or likely) adversely affecting the site's ecological character, including changes in land and water use and development projects
31. Conservation measures taken
32. Management planning
33. Planning for restoration
34. Conservation measures proposed but not yet implemented
35. Bibliographic references

Part 5. Providing additional information relevant to this Ramsar Site

274. In the case of a wetland that has been well-studied and well-documented, or which is the subject of special field investigations, far more information may be available than can be accommodated in the RIS. Additional information, such as taxonomic lists of species' status, management plans, copies of published papers or photocopied reports on the site, can be appended to the RIS and are treated as part of the official record of the site. Photographs of the wetland, with permission to make public use of them, are also especially welcome. It is essential that the source providing any such additional information be noted.

275. Where the Ramsar Site being designated is a very large and complex wetland system, or consists of a suite of separate sub-sites, two levels of approach may be advisable: a broad

approach for the system as a whole and a more detailed approach for each key locality or sub-site within the system. Thus for a particularly large wetland complex it may be appropriate to complete an overall RIS for the whole site and a series of separate RIS datasheets for each key area or sub-site within the complex.

276. Resolution VI.1 highlights the importance of clearly defining the ecological character of Ramsar Sites as the basis for monitoring these wetlands in order to maintain their ecological character. Key features of the ecological character of the site to be maintained should include those identified as the justification for designation under each Ramsar Criterion applied to the designation. Further guidance on defining and describing ecological character features is provided in the *New Guidelines for management planning for Ramsar Sites and other wetlands* (Resolution VIII.14).

277. The format of the RIS adopted by Ramsar COP11 emphasizes the importance of ecological character with Part 3 of the sheet structured to mirror the format of the ecological character description agreed by Resolution X.15: *Describing the ecological character of wetlands, and data needs and formats for core inventory: harmonized scientific and technical guidance*.

278. The annex to Resolution VI.1 notes that there is a need to increase the value of the information collected for describing and assessing the ecological character of listed sites, and it urges that emphasis should be given to:

- establishing a baseline by describing the ecological character of the site from which derive the ecosystem services of international importance (necessary because the existing Ramsar Criteria do not cover the full range of wetland benefits and values that should be considered when assessing the possible impact of changes at a site) – Part 3 of the RIS – 2012 revision applies; and

- providing information on human-induced factors that have affected or could significantly affect the benefits and values of international importance – field 30 of the RIS – 2012 revision applies.

279. The following sections provide guidance on completing sections of the RIS. Each is cross-referenced to the relevant RIS field.

7.1.3 Summary Description of the Ramsar Site

☞ **RIS Section 0**

280. Provide a short (100-300 word) descriptive text which encapsulates the key characteristics and internationally important aspects of the site. This text may also form the basis of the "Annontated List" summary text prepared by the Secretariat when the Site is placed on the Ramsar List.

7.2 Recording administrative and locational details

7.2.1 Name and address of the RIS compiler

☞ **RIS field 1**

281. Please provide the full name, institution/agency, postal address, telephone and fax numbers, and e-mail address of:

    a) the person(s) who compiled the RIS; and
    b) the Contracting Party's national Administrative Authority for the Convention.

7.2.2 Key dates

☞ **RIS field 2**

282. Please record the period over which the data and information used in RIS was collected, either a) at the time of designation or b) for RIS update. Note that this is **not** the date of compilation of the form, but rather the period (broadly) from which research and data and information gathering has been undertaken to inform the completion of the RIS.

283. Additional dates associated with the RIS will be recorded directly in the Ramsar Sites Database by the Secretariat.

7.2.3 Country

☞ **RIS field 3**

284. The official (short) version of the Contracting Party/country name.

7.2.4 Name of the Ramsar Site

☞ **RIS field 4**

♦ **See also: Appendix C Additional guidelines for the provision of maps**

285. The official name of the designated site in one of the three official languages (English, French or Spanish) of the Convention. Ensure that the site name used is the same in this section and on the maps provided (see also Appendix C). **This official name will be used precisely as given when the site is added to the Ramsar List.**

286. If appropriate, an alternative name, for example in a local language, can be given following the official name.

7.2.5 Designation of new Ramsar Site or update of existing site

☞ **RIS field 5**

287. Indicate in this field if the RIS is being provided for the designation of a new Ramsar Site or if it is an update for an existing Ramsar Site. If the RIS is an update for an existing site, please also complete field 6 of the RIS (see below).

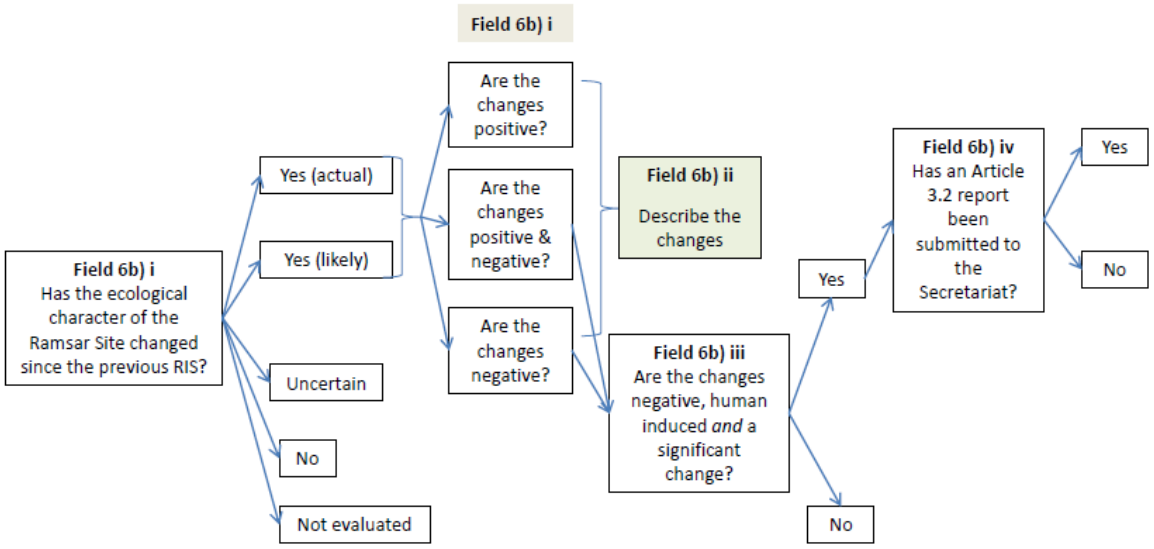
7.2.6 Updating the RIS: recording changes to the site since its designation or earlier update

☞ **RIS field 6**

288. RIS field 6 applies only when an RIS for an existing Ramsar Site is being updated and should be filled in only for such updates.

289. Field 6a seeks information on whether there have been any changes to the boundaries and/or the area of the site since the previous RIS was supplied. If there are any changes to the designated site boundary and/or site area, please tick the appropriate box or boxes to indicate the type of change that has occurred. The figure below summarises simply the logical sequence of the multiple choices in field 6b.

A summary of the questions related to ecological character in field 6b



290. The Convention text makes provision for the designation of new sites and the extension of existing sites, but the reduction in area (through a boundary restriction) or deletion from the List of sites already designated are governed by the terms of Article 2.5 concerning "urgent national interest". The annex to Resolution IX.6 (2005), *Guidance for addressing Ramsar Sites or parts of sites which no longer meet the Criteria for designation,* established procedures to follow should the deletion or reduction of a site be contemplated under circumstances which are not in the "urgent national interest". If the boundary and/or the area of the listed site is being contemplated for restriction/reduction, the Contracting Party should have followed the procedures established in Resolution IX.6 and provided a report in line with paragraph 28 of that annex, in addition to the provision of an updated RIS.

291. Field 6b) i seeks information as to whether the ecological character of the wetland has changed, or is likely to change, since the previously submitted RIS. There may be several reasons why the ecological character may have changed or be likely to change including influences within the site, the influence of factors beyond the site's boundaries (e.g., upstream water abstraction), or changes to the site's boundaries that lead to redefinition of its character. The options in the RIS allow the recording of a range of different scenarios as appropriate.

292. Field 6b) ii asks for a description of any changes in the ecological character of the Ramsar Site, including in the application of the Criteria (additions or deletions) since the previous

RIS for the site was submitted. If change of ecological character is negative, human-induced, and is a significant change (outside defined limits of acceptable change) please indicate this in field 6b) iii as well as whether an Article 3.2 report has been submitted to the Secretariat (in field 6b iv).

7.2.7 Defining the Site (map of the Ramsar Site)

☞ **RIS field 7**

♦ **See also: Appendix C, Additional guidelines for the provision of maps**

293. At designation, the most up-to-date map of the wetland should be submitted to the Secretariat with the RIS. This is a requirement for the inclusion of the site in the List of Wetlands of International Importance. The map must clearly show the boundary of the proposed Ramsar Site and be geo-referenced such that the location of the Site can be clearly identified.

294. The map must be provided in electronic format, using one of the common image formats (TIFF, BMP, JPEG, GIF, tc.).

295. A GIS file must be provided with the geo-referenced site boundary in vector form as one or more polygons (preferably using the World Geodetic System 1984 and the shape format) with an accompanying attribute table. The geographical/projected coordinate system used must be clearly specified.

296. Appendix C provides more detailed guidance on the provision of suitable Ramsar Site maps, GIS files, and other spatial data, including what to do if it is not possible to provide a GIS file.

297. Very exceptionally a hardcopy map will be accepted if it is not possible to submit a map in electronic format. In such a situation, this should be discussed and agreed with the Secretariat before submitting the site designation.

298. A list of the maps supplied and any other relevant maps of the Ramsar Site that are available should be included in a note annexed to the RIS.

7.2.8 Geographical coordinates

☞ **RIS field 8**

♦ **See also: Section 7.2.7 Defining the site (map of the Ramsar Site)**
Section 7.2.10 Area

299. The geographical coordinates of the *approximate* centre of the site should be given expressed in *degrees, minutes and seconds of latitude and longitude* (e.g., in the format: 01°24'12"S 104°16'25"E). If relevant, specify the number of discrete units forming the site, if there is more than one geographically separate part to the site.

300. If any such disjunct units are situated at least 1.6 km apart (approximately equivalent to one minute of latitude or longitude, at the equator in the case of longitude), the coordinates of the approximate centres of each of these units should be given separately (along with individual names or differentiating labels, e.g., "A, B, C"…, etc.). Any discrete

units so identified in an RIS should also be clearly labeled on the site map(s). A single site occupying less than 1,000 hectares needs only one central set of coordinates.

301. If the site is shaped in such a way that the approximate centre point cannot be easily specified, or if such a point falls outside the site or within a very narrow portion of the site, please explain this with a note, and provide the coordinates for the approximate centre point of the largest part of the site.

7.2.9 General location

☞ **RIS field 9**

302. Information about the general location of the wetland should include:

a) the name of the large administrative region(s) (i.e., state, province, territory, canton, etc.) within which the site lies (e.g., Alberta, Canada; Punjab, Pakistan; Andalucía, Spain); and
b) the nearest "provincial", "district" or other significant administrative centre, town, or city.

303. For wetlands on national boundaries, please also note in this field whether:

a) the wetland system extends into one or more other countries;
b) whether the site is adjacent to existing Ramsar Sites in the territory of another Contracting Party;
c) whether the site is part of a formal transboundary designation with another Contracting Party; and
d) in the case of formally designated Transboundary Ramsar Sites, whether the official name given differs from the Transboundary Ramsar Site name, in which case the different name should be reported.

7.2.10 Area

☞ **RIS field 10**

♦ **See also: Section 7.2.7 Defining the site (map of the Ramsar Site)**

304. The total area of the designated Ramsar Site should be given in hectares.

305. If the areas of any discrete site units are known, please also list each of these together with the names (or labels) used to identify and differentiate these units.

7.2.11 Biogeography

☞ **RIS field 11**

♦ **See also: Section 5.3 Biogeographic regionalizations**

306. The *biogeographic region* encompassing the Ramsar Site and the *biogeographic regionalization scheme* applied (with full reference citation) should be provided.

307. Biogeographical specification is essential for the correct application of Criteria 1 and 3 and certain applications of Criterion 2 (see also field 12 - Ramsar Criteria and their justification). In this context the guidelines for the application of the Ramsar Criteria (see

Appendix G) define "bio(geographic) region" as "a scientifically rigorous determination of regions as established using biological and physical parameters such as climate, soil type, vegetation cover, etc." Note that for non-island Contracting Parties, in many cases biogeographic regions will be transboundary in nature and will require collaboration between countries to establish the locations of representative, rare or unique examples of different wetland types.

308. Section 5.3 explains the Convention's approach to biogeographical regionalization in more detail. For coastal and near-shore marine areas, the Marine Ecoregions of the World (MEOW) regionalization should be used, as agreed by the Parties in Resolution X.20 (2008), recording the relevant Eco-region Province and Realm.

309. For terrestrial Ramsar Sites, one or more of the three alternative global schemes listed in Section 5.3 should be used (recording the smallest scale region that is appropriate).

310. Please give a citation of any other biogeographical regionalization scheme and other details if none of these four global schemes is appropriate.

7.3 What is the site like? (Ecological character description)

☞ **RIS Part 3**

311. General points of guidance for filling in this part of the RIS are as follows:

i) **Start with data and information is available.** In developing a description of the ecological character of a wetland, it is important to start with whatever data and information are currently available, even if information is not comprehensively available for all fields in the description sheet. Starting with compiling what is currently available helps to identify gaps and priorities for further data and information collection to enhance the description.

ii) **Start with a qualitative description if quantitative data are not available.** Even if detailed quantitative data are not available, begin by compiling qualitative data and information and do not underestimate the value of expert and local knowledge as a source of such information. Often, bringing together those who know the wetland best to share their knowledge can be an important and effective start to compiling the ecological character description.

iii) Simple **'conceptual models'** can be a powerful tool. Developing simple two- or three-dimensional 'conceptual models' accompanied by summary descriptions of key features, processes and functioning can be a powerful tool supporting the ecological character description. Further guidance on approaches to developing such conceptual models will be developed by the Scientific and Technical Review Panel. See Davis & Brock (2008) for one example of this approach for a Ramsar Site.

7.3.1 The key ecological components that determine the ecological character of the site

☞ **RIS field 13**

♦ **See also: worked examples of completed RIS at http://ris-2012.wikispaces.com/.**

312. Field 13 provides a key summary evaluation in the process of ecological character description. This field should record which of the ecological components described in Part 3.1, together with ecological processes (Part 3.2) and ecological services in Part 3.3, are critical to determining the ecological character of the Ramsar Site. The ecological character may be determined, for example, by aspects of climate, geology, anthropogenic management, or other features described in the various parts of the ecological character description.

313. It will usually be easier to complete this field *after* Parts 3.1 and 3.3 have been completed. Please see also the worked examples published at http://ris-2012.wikispaces.com/, which illustrate the type and level of information expected.

314. This section should aim to encapsulate all the information in Part 3 of the RIS so as to provide a simple description of what features are critical in determining the ecological character of the wetland. It may also be used as a source of information in preparing the Summary Description for Part 0 of the RIS. For further guidance see Ramsar Handbook 19: *Addressing change in wetland ecological character* (4th ed., 2010).

315.s This section should also be used to summarise the natural variability in the ecological character of the site (either seasonally, or longer-term if known), and any known past and current trends in ecological character, such as seral vegetation succession in part or all of the site.

7.3.2 Climate

☞ **RIS field 14**

316. Please indicate the prevailing climate type(s) occurring at the Site, using the widely adopted Köppen-Gieger Climate Classification System: http://en.wikipedia.org/wiki/K%C3%B6ppen_climate_classification.

317. If changing climatic conditions are affecting the site, please indicate the nature of these changes, in terms of how they are influencing the wetland, in a short descriptive paragraph.

7.3.3 Geomorphic setting

☞ **RIS field 15**

318. In part a), please record the minimum and maximum elevation of the wetland in metres above mean sea level. Elevations can be obtained via the Google Earth mapping programme for those without access to Geographical Information Systems.

319. In part b), please indicate the location of the Ramsar Site in relation to wider catchments by ticking all of the options which apply. If none of these categories apply, please describe the situation in the text box.

320. It is helpful to give the name of the catchment or basin if known – or in the case of coastal or near-coastal sites, the name of the sea or ocean within which the site is placed.

7.3.4 Plant communities

☞ **RIS field 12b**

321. This field relates to plant communities and their attributes, especially (but not exclusively) in the context of their international importance in the application of Criterion 2 for which the wetland is particularly important or significant. In the description box, please briefly specify *why* each community listed is considered noteworthy (e.g., if it has particular rarity or is economically important), if appropriate, also indicating that the plant community is of national or local significance. Note specifically whether each plant community qualifies under Criterion 2.

7.3.5 Plant species

☞ **RIS fields 12a, 17a and 17b**

♦ **See also: Section 6.1 Assessing the site against Ramsar's Criteria**

322. RIS field 12a documents those species that are recognized as internationally important in support of the qualification of the site through either Criteria 2, 3 or 4.

323. RIS field 17a documents other plants that are 'noteworthy' but do not directly support the qualification of the site as internationally important.

324. In field 12a, for each individual plant species please indicate its IUCN Red list status as follows:

Critically Endangered: CR
Endangered: EN
Vulnerable: VU

Note that other categories of IUCN Red List status (Near Threatened – NT; Least Concern – LC; Data Deficient – DD) do not qualify the species as internationally important for Ramsar Site designation. The Red List status of species can be accessed at www.iucnredlist.org/.

325. Please also indicate in the appropriate columns of field 12a if the species is either:

a) listed in Appendix I of CITES; and/or
b) considered as vulnerable, endangered or critically endangered under national endangered species legislation, programmes or Red Lists. In this case, please add the relevant citation details of such national legislation, programmes or Red Lists to field 35 (Bibliographic references).

326. In fields 12a and 17a, where relevant and if possible, specify why each animal species (or assemblage) is zoogeographically significant (e.g., relict populations, unusual range extensions or significant position within the overall geographic range, for instance that a site may be the most northerly occurrence of a certain species, etc.).

327. If endemic plant species have not been considered towards the application of Criterion 3 at the site (e.g., if the *number* of endemic species was not considered "significant", following the guidance for that Criterion), they can be listed in field 17a.

328. General species (occurrence) lists should not be included here or under other RIS fields, but such lists (properly labeled with site details) can be appended to the RIS when they are available, and this can be indicated in Part 5 of the RIS.

329. Field 17b should be completed to record the presence of any invasive alien plant species, as requested by the Parties in Resolution VII.14 and VIII.18. Please indicate whether the impacts of the invasive alien species are such as to actually (in which case, to what degree) or potentially threaten the ecological character of the Ramsar Site. If this is the case, please also record this in field 30 (Factors adversely affecting the ecological character of the site) and, for an updated RIS, also note it in field 6c. For RIS updates, please also note significant changes in the abundance and/or ecological impacts of invasive alien plant species

330. The scientific name, and the vernacular name (if one exists) in English, French or Spanish, should be given for each species listed. See section 5.7.4 for guidance on species nomenclature and taxonomy.

331. Where a very large number of species of importance occur, then those listed should include the most significant or important species in the context of the ecological character of the site.

7.3.6 Animal communities

☞ **RIS field 12d**

♦ **See also: Section 6.1 Assessing the site against Ramsar's Criteria**

332. This field relates to animal communities and their attributes, especially (but not exclusively) in the context of the application of Criteria 2 and/or 5. In the description box, please briefly specify why each community listed is considered noteworthy (e.g., if it has particular rarity or is economically important). Note specifically whether the community is significant in the context of Criteria 2 and/or 5, i.e., if it is grounds for the designation of the Site.

7.3.7 Animal species

☞ **RIS fields 12c, 18a and 18b**

333. RIS field 12c documents those animal species that are recognized as internationally important in support of the qualification of the site through either Criteria 2, 3, 4, 6, 7 or 9.

334. RIS field 17b documents other animal species that are 'noteworthy' but do not directly support the qualification of the site as internationally important.

335. If data are available, please give the most recent assessment of the population size of the species within the site, also providing units of assessment (e.g., pairs, individuals, etc.), the date of the assessment, and (for the application of Criteria 6 and 9) the proportion (percentage) of the relevant biogeographical population.

336. In field 12c, for each individual animal species please indicate its IUCN Red list status as follows:

Critically Endangered: CR

Endangered: EN
Vulnerable: VU

Note that other categories of IUCN Red List status (Near Threatened – NT; Least Concern – LC; Data Deficient – DD) do not qualify the species as internationally important for Ramsar Site designation. The Red List status of species can be accessed at www.iucnredlist.org/.

337. Please also indicate in the appropriate columns of field 12c if the species is either:

    a) listed in Appendix I of CITES; and/or
    b) considered as vulnerable, endangered or critically endangered under national endangered species legislation, programmes or Red Lists. In that case, please add the relevant citation details of such national legislation, programmes or Red Lists to field 35 (Bibliographic references).

338. In fields 12c and 18a, where relevant and if possible, specify why each animal species (or assemblage) listed is considered noteworthy (e.g., if it is an economically important species, or a "keystone" species, or a species associated with high wetland biodiversity values, e.g., turtles, crocodiles, otters, dolphins) or is zoogeographically significant (e.g., relict populations, unusual range extensions or significant position within the overall geographic range, for instance that a site may be the most southerly occurrence of a certain species, etc.).

339. Endemic animal species that have not been considered towards the application of relevant Criteria at the site (e.g., because either the number of endemic species was not considered "significant" (Criterion 3) or the percentage of endemic fish did not reach the threshold percentage for the application of Criterion 7) should be listed in field 18a.

340. General species (occurrence) lists should not be included here or under other RIS fields, but such lists (properly labeled with site details) can be appended to the RIS when they are available, and this may be indicated in Part 5 of the RIS.

341. Where a very large number of species of importance occur, then those listed should include the most significant or important species in the context of the ecological character of the site.

342. Field 18b should be completed to record the presence of any invasive alien animal species, as requested by the Parties in Resolution VII.14 and VIII.18. Please indicate whether the impacts of the invasive alien species are such as to actually (in which case, to what degree) or potentially threaten the ecological character of the Ramsar Site. If this is the case, please also record this in field 30 (Factors adversely affecting the ecological character of the site) and, for an updated RIS, also note this in field 6c. For RIS updates, please also note significant changes in the abundance and/or ecological impacts of invasive alien animal species.

343. The scientific name, and the vernacular name (if one exists) in English, French or Spanish, should be given for each species listed. See section 5.7.4 for guidance on species nomenclature and taxonomy.

7.3.8 Soil

☞ **RIS field 19**

344. Please indicate the predominant soil types across the site as *a whole*. Also indicate whether soil types are subject to change as a result of changing hydrological conditions (e.g., increased salinity or acidification).

7.3.9 Water regime

☞ **RIS field 20**

345. Field 20 provides information about the hydrology of the site, and specifically the permanence of water at the site, its source and destination, and the stability of the water regime. Please tick all options that apply under each heading.

346. Information about other key hydrological features such as evaporation, flooding frequency, seasonality and duration of water flows; magnitude of flow and/or tidal regimes, and links with groundwater can be added in the text box if appropriate.

347. For RIS updates, please also note significant change in any of these hydrological elements.

348. Other RIS fields cover other aspects of the hydrology of site: field 22 (water pH); field 23 (water salinity); field 24 (nutrients in water) and field 26 (ecosystem services/benefits).

7.3.10 Sediment regime

☞ **RIS field 21**

349. If known, please indicate whether significant erosion, accretion or deposition, or transportation of sediments occurs on or through the site.

350. For RIS updates, please also note significant change in sediment regimes.

7.3.11 Water pH

☞ **RIS field 22**

351. If known, please note the approximate pH regime averaged across the site as a whole.

352. For RIS updates, please also note significant change in pH.

7.3.12 Water salinity

☞ **RIS field 23**

353. If known, please note the water salinity averaged across the site as a whole.

354. For RIS updates, please also note significant change in salinity.

7.3.13 Dissolved or suspended nutrients in water

☞ **RIS field 24**

355. If known, please note the relevant categories of dissolved or suspended nutrients in water, averaged across the site as a whole.

356. For RIS updates, please also note significant change in dissolved or suspended nutrients.

7.3.14 Physical features of the surrounding area

☞ **RIS field 25**

357. Please describe whether, and if so how, the landscape and ecological characteristics in the wider catchment or area surrounding the Ramsar Site differ from the Ramsar Site itself. Indicate all the categories which apply.

7.3.15 Ecological processes

☞ **RIS Part 3.2**

358. Ecological processes are an important component of the definition of ecological character. The main ecological processes – as included in the Convention's format for describing ecological character (Resolution X.15) – are listed here for the sake of completeness and compatibility.

359. It is **not** envisaged that information on ecological processes should need to be reported as part of a normal RIS submission. However, if a Contracting Party does have information available that is relevant to these fields (for example, from a national Ecological Character Description form) it may, if it wishes to, include information in these additional fields.

7.3.16 Ecosystem services

☞ **RIS field 26**

360. Wetlands exist within landscapes in which people's activities are influenced by the wetlands and the delivery of their ecosystem services, and in which the wetlands themselves are influenced by the use of such services by dependent local communities (e.g., by forms of traditional management). There are many examples where the ecosystem structure and functioning of the wetland have developed as a result of cultural features or legacies. There are also many examples where the maintenance of the ecosystem structure and functioning of wetlands depends upon the interaction between human activities and the wetland's biological, chemical, and physical components.

361. Field 26 of the RIS requests a summary of the main ecosystem services currently provided by the site. These are organized against the Millennium Ecosystem Assessment's (2003) classification of Provisioning, Regulating, Cultural and Supporting Services. If there are other ecosystem services occurring on the site which do not fit against this classification or the examples given, then please also describe them.

362. First, please indicate each service known to occur on the site. Then, if possible, indicate the relative importance of services provided by the site as follows:

0 = not relevant for the site
1 = present but low importance/extent or significance
2 = present, medium importance/extent or significance
3 = present, high importance/extent or significance

363. It is also helpful to record in this field whether or not there have been studies or assessments of the economic valuation of ecosystem provided by the Ramsar Site, whether published or unpublished.

7.3.17 Social or cultural values

☞ **RIS field 27**

♦ **See also: Section 7.4.3 Factors adversely affecting the site's ecological character**

364. Indicate here whether the site is considered of international importance for holding, in addition to relevant ecological values, examples of significant cultural values, whether material or non-material, linked to its origin, conservation, and/or ecological functioning. If so, provide information about this importance according to the categories adopted by Resolution IX.21 (www.ramsar.org/pdf/res/key_res_ix_21_e.pdf).

365. Details about values derived from non-sustainable exploitation or which result in detrimental ecological changes should be described in field 30 (Factors adversely affecting the site's ecological character).

7.4 How is the site managed (Conservation and management) – RIS part 4

7.4.1 Land tenure/ownership

☞ **RIS field 28**

366. Field 28 summarizes details of land ownership/tenure both of the Ramsar Site and the surrounding areas. Please indicate all the categories which apply at the site or in the surrounding area (which should be interpreted as that area around the Site where land-use or other human factors might influence the ecological character of the wetland).

7.4.2 Management authority

☞ **RIS field 29**

367. Please provide the name and address of the local office(s) of the agency(ies) or organization(s) directly responsible for managing the wetland. Wherever possible, provide also the title and/or name of the person or persons in this office with responsibility for the wetland.

7.4.3 Factors adversely affecting the site's ecological character

☞ **RIS field 30**

♦ **See also: Appendix F, Explanation of categories of factors adversely affecting the site's ecological character**

368. Field 30 requests a summary of the human and natural factors affecting the ecological character of the site, both within and around the site (including the greater catchment, if

relevant). These may include new or changing activities/uses, major development projects, etc., which have had, are having, or may have a detrimental effect on the natural ecological character of the wetland.

369. It is important to specify both the agent for the change (e.g., diversion of water, drainage, reclamation, pollution, over-grazing, excessive human disturbance, or excessive hunting and fishing, etc.) and the resulting change and its impact (e.g., siltation, erosion, fish mortality, change in vegetation structure, habitat fragmentation, disturbed reproduction of species, physical or ecological change due to climate change, etc.). It is also important to differentiate between factors coming from within the site itself and those factors emanating from outside the site, but which are having or may have an impact on the site. Please distinguish between actual (currently occurring) and potential (likely to occur) adverse factors.

370. When reporting on pollution, special notice should be taken of toxic chemical pollutants and their sources. These should include industrial and agricultural-based chemical effluents and other emissions.

371. There can be occasions when more than one factors impacting on a site occur together, and act in combination or synergistically to result in severe impacts. In instances where an adverse combination of impacts may be affecting the ecological character of a site, details should be provided in the relevant text box.

372. Please also detail significant natural events, including episodic catastrophes (e.g., an earthquake or volcanic eruption) or natural vegetative succession which have had, are having, or are likely to have an impact on the ecological character of the site, in order to facilitate monitoring.

373. Further information on what is covered by each category of factor listed in RIS field 30 is provided in Appendix F.

7.4.4 Conservation measures taken

☞ **RIS field 31**

374. In field 31a, please provide details of any other relevant conservation status which either wholly or partly overlaps with the Ramsar Site as follows:

- Global international legal and other formal designations;
- Regional international legal and other formal designations;
- National legal and other formal designations; and
- Non-statutory designations.

375. If a reserve has been established, give the date of establishment and size of the protected area.

376. In field 31b, list the IUCN (Dudley 2008) protected areas management category/ies which apply to the site. These are as follows:

Category	Definition
Ia Strict Nature Reserve: protected area managed mainly for science	Area of land and/or sea possessing some outstanding or representative ecosystems, geological or physiological features and/or species, available primarily for scientific research and/or environmental monitoring.
Ib Wilderness Area: protected area managed mainly for wilderness protection	Large area of unmodified or slightly modified land, and/or sea, retaining its natural character and influence, without permanent or significant habitation, which is protected and managed so as to preserve its natural condition.
II National Park: protected area managed mainly for ecosystem protection and recreation	Natural area of land and/or sea, designated to (a) protect the ecological integrity of one or more ecosystems for present and future generations, (b) exclude exploitation or occupation inimical to the purposes of designation of the area and (c) provide a foundation for spiritual, scientific, educational, recreational and visitor opportunities, all of which must be environmentally and culturally compatible.
III Natural Monument: protected area managed mainly for conservation of specific natural features	Area containing one, or more, specific natural or natural/cultural feature which is of outstanding or unique value because of its inherent rarity, representative or aesthetic qualities or cultural significance.
IV Habitat/Species Management Area: protected area managed mainly for conservation through management intervention	Area of land and/or sea subject to active intervention for management purposes so as to ensure the maintenance of habitats and/or to meet the requirements of specific species.
V Protected Landscape/ Seascape: protected area managed mainly for landscape/seascape conservation and recreation	Area of land, with coast and sea as appropriate, where the interaction of people and nature over time has produced an area of distinct character with significant aesthetic, ecological and/or cultural value, and often with high biological diversity. Safeguarding the integrity of this traditional interaction is vital to the protection, maintenance and evolution of such an area.
VI Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems	Area containing predominantly unmodified natural systems, managed to ensure long term protection and maintenance of biological diversity, while providing at the same time a sustainable flow of natural products and services to meet community needs.

377. IUCN defines a "protected area" as "a clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values" (Dudley 2008).

378. Field 34 summarizes the conservation measures (including and beyond restoration) that are either proposed or being currently undertaken at a site. Please indicate those key measures that are proposed or being undertaken to maintain ecological character. Indicate those measures not currently implemented but proposed, those measures that are partially implemented, and those measures being fully implemented. Partial implementation may involve, for example, a measure being implemented across part of the site only (yet with

the intention for wider implementation), or measures only partly implemented such as a restriction which is currently voluntary but for which formal regulation is anticipated/desired. Note that there may be overlap between the categories.

379. In the 'other' category please describe those measures that are not covered by the above categories.

7.4.5 Management planning

☞ **RIS field 32**

♦ **See also: Ramsar Handbook 18, *Managing wetlands: Frameworks for managing Wetlands of International Importance and other wetland sites* (4th ed., 2010)**

380. Where a management plan has been prepared for the site being designated, the information provided in the RIS should be consistent with the plan's description of ecological character features, the values and functions of the wetland, the factors affecting or likely to affect its character, values and functions, and the management planning process, including monitoring.

381. Describe the management planning process for the site in field 32 of the RIS, including any plan developed and being implemented, including whether it has been officially approved.

382. Record whether a management effectiveness assessment e.g., www.wdpa.org/ME/tools.aspx has been undertaken for the site in field 32.

383. Cite the management plan document(s) in field 35 (Bibliographic references) and if possible provide a copy of the plan as supplementary information to the RIS.

384. When a management plan is prepared as part of the management planning process for the site after it has been designated as a Ramsar Site, the information in the RIS should be checked and, if necessary, a revised RIS should be completed and sent to the Ramsar Secretariat.

7.4.6 Planning for restoration

☞ **RIS field 33**

385. Field 33 summarizes any activities, if relevant, related to restoration. Where such activity is being undertaken or planned, please indicate whether this affects the whole Ramsar Site or just part of it.

7.4.7 Monitoring implemented or proposed at the site

☞ **RIS field 34**

386. Monitoring, as outlined in Ramsar Handbooks 13 (*Inventory, assessment, and monitoring: an Integrated Framework for wetland inventory, assessment, and monitoring* - Ramsar Convention Secretariat 2010c) and 18 (Man*aging wetlands: Frameworks for managing Wetlands of International Importance and other wetland sites* – Ramsar Convention Secretariat 2010e) will be described within the site management plan and is essential to ensure site objectives are met.

387. Please provide information concerning proposed, partial or actual monitoring at the site in field 34. This means either annual or periodic monitoring of features of importance at the site, rather than 'one-off' surveys to define or describe environmental or ecological features of a site.

388. For "partially implemented" monitoring this may refer to, for example, monitoring occurring on part of a site or a low level of monitoring likely to be insufficient to fully effective to achieve its objectives. In the 'other' category please describe those monitoring activities that are not covered by the above categories.

7.4.8 Bibliographic references

☞ **RIS field 35**

389. Please provide here a list of key technical references related to the wetland, including management plans, major scientific reports, and bibliographies, if such exist. Please list any functional/active website addresses dedicated to the Ramsar Site or which prominently feature the site (e.g., a website detailing all of a country's Ramsar Sites), and include the date that the website was most recently updated.

390. When a large body of published material is available about the site, only the most important references need to be cited, with priority being given to recent literature containing extensive bibliographies.

391. Reprints or copies of the most important literature, including a copy of any management plan, should be appended whenever possible or preferably web-links given where such publications are available online.

7.5 Providing additional information relevant to this Ramsar Site

☞ **RIS part 5**

392. If supporting or additional information about the Ramsar Site is available, please indicate that in RIS Part 5, and provide such additional information to the Secretariat as separate documents.

393. Such information might be:

i) taxonomic lists of plant and animal species occurring in the site (see RIS Fields 17 & 18)
ii) a detailed Ecological Character Description (ECD) (in a national format)
iii) a national wetland inventory entry or description
iv) relevant Article 3.2 reports
v) a site management plan (see RIS field 32)
vi) other important published literature (see RIS field 35).

394. All such additional information sources will be made available by the Secretariat through the Ramsar Sites Information Service (RSIS) website.

8. Site description: updating the Ramsar Site Information Sheet

What does this section do? Gives specific guidance on updating Information Sheets about already designated Ramsar Sites

395. In Resolution VI.13 (1996), Contracting Parties have undertaken to provide updated Information Sheets for Ramsar Sites at least every six years (calculated from the date of designation).

396. In the event of actual or potential change in the ecological character of a Ramsar Site, Article 3.2 of the Convention requires Contracting Parties to inform the Secretariat "without delay". Such notifications should typically be accompanied by an updated RIS, but for other sites, the RIS should be updated at least every six years in any case.

397. The process of RIS update should involve the systematic review of all RIS fields. Whilst there may be few or no changes to many of the descriptive fields, typically new data and information will be available through site monitoring programmes. There may also be improved understanding of the ecological character of the site, possibly through research programmes. Such new information should be used to update the RIS.

398. Some of the RIS fields include information that specifically relates to RIS updates (fields 2, 6, 20 and 30). These are specifically designed to track changes in ecological character, and factors influencing it, through time.

399. The central element of an RIS update is a reassessment of the ecological character of the site (field 13). It is recommended that other fields in Parts 3 and 4 of the form be completed before revising field 13. The ecological character of the site may have changed because of:

- improved understanding of ecological processes as a result of new data and information from monitoring or research programmes; and/or
- changes that are the result of factors external to the site (e.g., climate changes influencing the hydrological regime); and/or
- changes that are the result of factors operating within the site (e.g., anthropogenic impacts).

400. Further information about addressing change in ecological character is given in Ramsar Handbook 19 (4th ed., 2010).

401. Should current data and information indicate the need to alter the ecological character description, then field 13 should be revised accordingly. Field 6b should also be completed to indicate the location of factors responsible for the changed ecological character. Finally, field 6c should be completed to *describe* the changes.

402. Updating field 2 – on the date of the data and information used – is an important part of the RIS update process. This field records the period over which the data and information used in the RIS was collected. For a new RIS, this date would typically relate to 'contemporary' data – usually (but not always) for a period of five years or so prior to the designation.

404. For an updated RIS, field 2 should record the period during which the new data and information summarized was collected. Thus for example, for a Ramsar Site designated for its international importance for waterbirds, and where there is an active monitoring programme, this would be the most recent five year period of assessment (which would also be the period given in field 12c alongside the assessments of each waterbird species.

9. Understanding Ramsar Site designation processes and responsibilities

404. The Ramsar Site Information Sheet (RIS) is an official document of the Convention and is made publicly available by the Secretariat.

405. There are three main stages to the designation process:

i) the designation of a Ramsar Site,
ii) the Site being placed on the formal List of Wetlands of International Importance (the Ramsar List), and
iii) the data and information provided in an RIS being entered into the Ramsar Sites Database and, with any additional information, this being made available through the Ramsar Sites Information Service (RSIS) website.

406. The key roles and responsibilities are that:

i) **Contracting Parties** are responsible for identifying, compiling information, and designating wetlands within their territory that qualify as internationally important;
ii) The **Ramsar Secretariat** is responsible for checking and confirming that the RIS and its map(s) confirm that the site qualifies for designation under the Ramsar Criteria, and that the RIS and its map(s) have been correctly completed in line with the adopted guidance for this, and then for placing the designated site on the Ramsar List; and
iii) Under a longstanding arrangement decided by the Standing Committee, **Wetlands International** is responsible for maintaining the Ramsar Sites Database and RSIS, under a contractual arrangement with the Ramsar Secretariat.

9.1 Designating a Ramsar Site (and updating Ramsar Site information)

407. It is solely the role and responsibility of a Contracting Party to **designate** a wetland within its territory as being internationally important under the Ramsar Convention, and to prepare and submit the RIS (including maps) in the correct format to the Secretariat.

408. The RIS for a newly designated Site (or an update to the RIS for a previously designated site) must be officially transmitted to the Secretariat by the Ramsar Administrative Authority (AA) of the Contracting Party concerned, with a letter clearly stating that the wetland is being designated for inclusion in the Ramsar List and specifying the formal date of designation if wished.

409. The RIS (including maps) and supporting materials must be provided to the Secretariat in its electronic format (MS Word), by email or on CD-ROM, or through the online RIS submission system, once available (see below). If the Party so wishes, it may also transmit a

printed copy of the RIS materials under a diplomatic notification or official letter to the Secretariat.

410. There are plans to establish a Web-based online facility for the submission of these materials, and once that has become operational, the Administrative Authority may alternatively prepare and submit the RIS (including maps and any supporting materials) to the Secretariat through that facility. The Secretariat will provide supplementary advice concerning the online submission process for RISs at that time.

411. Some Contracting Party have established formal national procedures to be followed prior to designating a Ramsar Site (for example, gazetting the site under national legislation) which may make it difficult to amend or correct any information in the RIS once it has been submitted to the Secretariat. Since (see below) the Ramsar Secretariat is charged with checking and confirming that the RIS has been correctly compiled in the approved format and that the Site qualifies for designation under the Criteria for international importance, when preparing an RIS such Parties are strongly urged to provide a draft to the Secretariat prior to their formal designation of the Site, so that any clarifications or amendments can be made before the national designation procedures are effected.

Designating a Ramsar Site at the time of the accession of a new Contracting Party

412. Under Article 2.4 of the Convention, as part of its accession a Contracting Party must designate at least one wetland as a Ramsar Site. At the time of accession that Party is required to provide just the name and a map of the site (or sites) being designated, since the RIS process was only later established by the Convention. However, a country preparing for accession is strongly urged to prepare an RIS at that time for each site being designated, and to consult with the Secretariat on the draft RIS, so that the Secretariat can confirm clearly that the site does indeed qualify for designation as internationally important.

Assigning a date of designation of a Ramsar Site

413. The date of designation or update of a Ramsar Site is that indicated or requested by the Ramsar Administrative Authority (AA). The designation date required should be indicated in the designation letter from the AA to the Secretariat that accompanies the RIS.

414. If no designation date is indicated to the Secretariat, the Secretariat assigns the date of the designation letter or email from the Administrative Authority as the designation date of the site.

415. If, following the receipt and review of the RIS by the Secretariat (see below), a significant time-period elapses before any problems with the RIS content are resolved with the Administrative Authority, the Secretariat may propose that, with the agreement of the AA, the date of designation is that on which the RIS is finalised.

416. For a Ramsar Site designated at the time of accession by a new Contracting Party, the date of designation is that of the date of accession, as advised to the Secretariat by UNESCO (which is the Convention's legal depositary).

9.2 Reviewing the RIS content and Listing the Ramsar Site

417. These parts of the Ramsar Site designation process are the responsibility of the Ramsar Secretariat.

418. Under the terms of Resolution VIII.13 (2002) *Enhancing the information on Wetlands of International Importance (Ramsar Sites)*, the Ramsar Secretariat is required to review the RIS (including maps) to confirm that:

    i) the correct current approved format of the RIS has been used;

    ii) the information provided in the RIS has been included correctly in each of the RIS sections and fields, and that there is an appropriate minimum level of information provided, in line with the guidance provided in the most recently adopted version of the *Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance of the Convention on Wetlands*;

    iii) RIS maps have been prepared and provided in conformity with the specific guidance adopted for map preparation (see Appendix C); and

    iv) very importantly, the information provided in the RIS concerning the Criteria for the site's international importance and the justifications for each Criterion applied confirm that a) the site does qualify for designation as internationally important, and b) each Criterion has been correctly applied.

419. Following this review, if the Secretariat identifies any problems with the format and content of the RIS (including maps), it discusses these with the Administrative Authority in order to agree and make any adjustments to the RIS for its finalization.

420. Once the Secretariat confirms that the RIS meets the above requirements, the Secretary General approves the Site to be formally placed on the List of Wetlands of International Importance.

421. With that approval confirmed the Secretariat then:

    i) allocates a *Ramsar Site number* to the site (which is simply the numerical order in which sites have been added to the Ramsar List, regardless of formal designation dates (www.ramsar.org/pdf/sitelist_order.pdf));

    ii) adds the Site to the Ramsar List (www.ramsar.org/pdf/sitelist.pdf), along with a brief summary text describing the site in the Annotated List (www.ramsar.org/anno-list);

    iii) posts this information on the Ramsar website and announces the designation on the website and Ramsar Forum and Exchange list-servers;

    iv) prepares an official letter of acknowledgement to the Administrative Authority and sends this along with a "Ramsar Site Diploma" (or several copies if requested);

v) prepares and sends an official letter to the Ramsar Site manager identified by the AA in field 29 of the RIS;

vi) enters the data and information from the RIS into the Ramsar Sites Database; and

vii) sends the electronic RIS (including maps and any supplementary information provided by the AA) to Wetlands International for posting on the Ramsar Sites Information Service (RSIS) website.

422. Concerning **updates** to existing Ramsar Sites, the Secretariat follows the same review procedures for updated RISs, but in addition checks that all RIS fields required specifically for updates have been correctly completed. For updates, the Secretariat advises the AA and site manager by e-mail when the updated information has been added to the Ramsar List.

9.3 Maintaining up-to-date and accessible information on Ramsar Sites

423. The Ramsar Secretariat is the custodian of the official Ramsar Sites archive of RISs and any supplementary information on Ramsar Sites provided by Contracting Parties, in both electronic and hard-copy formats.

424. Under a longstanding arrangement decided by the Standing Committee, Wetlands International maintains and develops the *Ramsar Sites Information Service (RSIS)* (http://ramsar.wetlands.org/) under a contractual arrangement with the Secretariat.

425. The RSIS provides online access to the data and information on all designated Ramsar Sites. It includes the searchable Ramsar Sites Database, which holds coded information on designated sites; access to downloadable copies of RISs (including maps and supplementary information) and Annotated List summaries; digital (shape-file) boundaries of sites, where available; interactive maps and the facility to view and access the locations and site information on the Google Earth platform; regularly updated summary Ramsar Site statistics; and a 'Tools for Parties' section which provides links to a range of reports and information helpful for supporting Parties' identification, application of Criteria, and designation of Ramsar Sites.

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Appendix A
Ramsar Information Sheet

The Ramsar Site Information Sheet (RIS) - 2012 revision (COP11 Resolution XI.8 Annex 1) is available at http://www.ramsar.org/doc/cop11/res/cop11-res08-e-anx1.doc and http://www.ramsar.org/pdf/cop11/res/cop11-res08-e-anx1.pdf.

Appendix B
Ramsar Classification System for Wetland Type

The codes are based upon the Ramsar Classification System for Wetland Type as approved by Recommendation 4.7 and amended by Resolutions VI.5 and VII.11 of the Conference of the Contracting Parties. The categories listed here are intended to provide only a very broad framework to aid rapid identification of the main wetland habitats represented at each site.

To assist in identification of the correct Wetland Types to list in field 16 of the RIS, the table below outlines some of the characteristics of each Wetland Type.

Marine/Coastal Wetlands

A -- **Permanent shallow marine waters** in most cases less than six metres deep at low tide; includes sea bays and straits.
B -- **Marine subtidal aquatic beds**; includes kelp beds, sea-grass beds, tropical marine meadows.
C -- **Coral reefs**.
D -- **Rocky marine shores**; includes rocky offshore islands, sea cliffs.
E -- **Sand, shingle or pebble shores**; includes sand bars, spits and sandy islets; includes dune systems and humid dune slacks.
F -- **Estuarine waters**; permanent water of estuaries and estuarine systems of deltas.
G -- **Intertidal mud, sand or salt flats**.
Ga -- **Bivalve (shellfish) reefs.**
H -- **Intertidal marshes**; includes salt marshes, salt meadows, saltings, raised salt marshes; includes tidal brackish and freshwater marshes.
I -- **Intertidal forested wetlands**; includes mangrove swamps, nipah swamps and tidal freshwater swamp forests.
J -- **Coastal brackish/saline lagoons**; brackish to saline lagoons with at least one relatively narrow connection to the sea.
K -- **Coastal freshwater lagoons**; includes freshwater delta lagoons.
Zk(a) – **Karst and other subterranean hydrological systems**, marine/coastal

Inland Wetlands

L -- **Permanent inland deltas**.
M -- **Permanent rivers/streams/creeks**; includes waterfalls.
N -- **Seasonal/intermittent/irregular rivers/streams/creeks**.
O -- **Permanent freshwater lakes** (over 8 ha); includes large oxbow lakes.
P -- **Seasonal/intermittent freshwater lakes** (over 8 ha); includes floodplain lakes.
Q -- **Permanent saline/brackish/alkaline lakes**.

R -- **Seasonal/intermittent saline/brackish/alkaline lakes and flats**.
Sp -- **Permanent saline/brackish/alkaline marshes/pools**.
Ss -- **Seasonal/intermittent saline/brackish/alkaline marshes/pools**.
Tp -- **Permanent freshwater marshes/pools**; ponds (below 8 ha), marshes and swamps on inorganic soils; with emergent vegetation water-logged for at least most of the growing season.
Ts -- **Seasonal/intermittent freshwater marshes/pools on inorganic soils**; includes sloughs, potholes, seasonally flooded meadows, sedge marshes.
U -- **Non-forested peatlands**; includes shrub or open bogs, swamps, fens.
Va -- **Alpine wetlands**; includes alpine meadows, temporary waters from snowmelt.
Vt -- **Tundra wetlands**; includes tundra pools, temporary waters from snowmelt.
W -- **Shrub-dominated wetlands**; shrub swamps, shrub-dominated freshwater marshes, shrub carr, alder thicket on inorganic soils.
Xf -- **Freshwater, tree-dominated wetlands**; includes freshwater swamp forests, seasonally flooded forests, wooded swamps on inorganic soils.
Xp -- **Forested peatlands**; peatswamp forests.
Y -- **Freshwater springs; oases**.
Zg -- **Geothermal wetlands**
Zk(b) – **Karst and other subterranean hydrological systems**, inland

Note: "**floodplain**" is a broad term used to refer to one or more wetland types, which may include examples from the R, Ss, Ts, W, Xf, Xp, or other wetland types. Some examples of floodplain wetlands are seasonally inundated grassland (including natural wet meadows), shrublands, woodlands and forests. Floodplain wetlands are not listed as a specific wetland type herein.

Human-made wetlands

1 -- **Aquaculture** (e.g., fish/shrimp) **ponds**
2 -- **Ponds**; includes farm ponds, stock ponds, small tanks; (generally below 8 ha).
3 -- **Irrigated land**; includes irrigation channels and rice fields.
4 -- **Seasonally flooded agricultural land** (including intensively managed or grazed wet meadow or pasture).
5 -- **Salt exploitation sites**; salt pans, salines, etc.
6 -- **Water storage areas**; reservoirs/barrages/dams/impoundments (generally over 8 ha).
7 -- **Excavations**; gravel/brick/clay pits; borrow pits, mining pools.
8 -- **Wastewater treatment areas**; sewage farms, settling ponds, oxidation basins, etc.
9 -- **Canals and drainage channels, ditches.**
Zk(c) – **Karst and other subterranean hydrological systems**, human-made

Tabulations of Wetland Type characteristics

Marine / Coastal Wetlands:

Saline water	Permanent	< 6 m deep	A
		Underwater vegetation	B
		Coral reefs	C
	Shores	Rocky	D
		Sand, shingle or pebble	E
Saline or brackish water	Intertidal	Flats (mud, sand or salt)	G
		Bivalve (shellfish) reefs	Ga
		Marshes	H
		Forested	I
	Lagoons		J
	Estuarine waters		F
Saline, brackish or fresh water	Subterranean		Zk(a)
Fresh water	Lagoons		K

Inland Wetlands:

Fresh water	Flowing water	Permanent	Rivers, streams, creeks	M
			Deltas	L
			Springs, oases	Y
		Seasonal/intermittent	Rivers, streams, creeks	N
	Lakes and pools	Permanent	> 8 ha	O
			< 8 ha	Tp
		Seasonal/intermittent	> 8 ha	P
			< 8 ha	Ts
	Marshes on inorganic soils	Permanent	Herb-dominated	Tp
		Permanent/ Seasonal/intermittent	Shrub-dominated	W
			Tree-dominated	Xf
		Seasonal/intermittent	Herb-dominated	Ts
	Marshes on peat soils	Permanent	Non-forested	U
			Forested	Xp
	Marshes on inorganic or peat soils	High altitude (montane)		Va
		Tundra		Vt
Saline, brackish or alkaline water	Lakes	Permanent		Q
		Seasonal/intermittent		R
	Marshes & pools	Permanent		Sp
		Seasonal/intermittent		Ss
Fresh, saline, brackish or alkaline water	Geothermal			Zg
	Subterranean			Zk(b)

Appendix C
Additional guidelines for the provision of maps and other spatial data for Ramsar Sites

The following guidance has drawn from the experience of Wetlands International and the Ramsar Secretariat, the World Heritage Convention, and the UNEP-World Conservation Monitoring Centre, as well as from the guidance provided in: World Heritage Convention 1999. *Meeting to recommend digital and cartographic guidelines for World Heritage site nominations and state of conservation reports.* In: WHC-99/CONF.209/INF.19. Paris, 15 November 1999. WWW document: www.unesco.org/whc/archive/99-209-inf19.pdf

1. The provision of a suitable map or maps is a requirement under Article 2.1 of the Convention – it is fundamental to the process of designating a Wetland of International Importance (Ramsar Site), and is an essential part of the information supplied in the *Information Sheet on Ramsar Wetlands (RIS).* Clear mapped information about the site is also vital for its management.

2. This additional guidance recognizes that Contracting Parties have increasing capacity to prepare and supply Ramsar Site maps in digital formats (for example, through the use of electronic Geographical Information System (GIS) software) and to delineate site boundaries through the establishment of precise Global Positioning System (GPS) way-points.

3. Maps provided by a Contracting Party on designation (or update) of a Ramsar Site should as high priority attributes:

   i) **clearly show the precise boundary of the Ramsar Site**;

   ii) **be prepared to professional cartographic standards**: maps not prepared to professional cartographic standards are problematic, since even moderately-opaque hand-drawn site boundaries or cross-hatching (e.g., to indicate zonation) often obscure other important map features. Although coloured annotations may appear distinguishable from the underlying map features on the map original, it is important to remember that most colours cannot be differentiated in any black and white photocopies. Such additional information should be provided on additional outline maps;

   iii) **show the Ramsar Site in its natural or modified environment and should be within the scale ranges specified below**, depending upon the size of the site;

   iv) **if the site is adjacent to, or now includes, a previously designated Ramsar Site, the (former or active) boundaries of all of such sites should be shown**, making clear the current status of all such previously designated areas;

   v) **include a key or legend that clearly identifies the Ramsar Site boundary and each other category of feature** shown on the map and relevant to the designation of the site;

vi) **show the map's scale, an indication of geographical coordinates** (latitude and longitude), **an indication of compass bearing** (north arrow) and**information on the map's projection**; and

vii) **include a title that explicitly cites the official name for the Ramsar Site** (as given in RIS field 4).

4. The most suitable map or set of maps for the designation of a Ramsar Site will also clearly show the following, although provision of such information is of lower priority than the attributes listed above in paragraph 3 of this Appendix:

i) basic topographical information;

ii) the boundaries of relevant protected area designations (e.g. National Park, nature reserve, etc.) and administrative boundaries (e.g., province, district, etc.);

iii) clearly delineated wetland and non-wetland parts of the site, and depiction of the wetland boundary with respect to the site's boundary, especially where the wetland extends beyond the site being designated. Where available, information on the distribution of the main wetland habitat types and key hydrological features is also useful. Where there is substantial seasonal variation in the extent of the wetland, separate maps showing the wetland extent in the wet and in the dry seasons are helpful;

iv) major landmarks (towns, roads, etc.); and

v) distribution of land uses in the same catchment.

5. A general location map, showing the location of the Ramsar Site within the territory of the Contracting Party, is also extremely useful.

6. Maps should not be trimmed, so that data managers and Ramsar Secretariat staff can consult any printed marginal notes or coordinate tick marks.

7. Maps should be provided in digital format using one of the common image format (TIFF, BMP, JPG, GIF, etc.).

8. Exceptionally, for Contracting Parties with no easy access to software (such as GIS) and data (such as topographic layers) allowing the preparation of digital maps, Google Earth and ArcGIS online (http://www.arcgis.com/home/) can be useful tools to help draw the digital boundaries of the proposed Ramsar Site. These should be used only where the resolution of the background topographic layer proposed by these free online tools is sufficient to show clearly the wetland and important other features. Very exceptionally, hardcopy maps – A4 or A3 size- can be accepted, if it is not possible to submit an electronic or digital map.

Guidelines for the provision GIS Ramsar Site boundaries

9. In light of the increasing importance of GIS technologies in decision-making processes (e.g., for land use management, development projects, etc), it is essential for the Ramsar Convention to be able to display publicly Ramsar Sites GIS boundaries in addition to the digital map. Hence, for any GIS-derived digital map provided, the corresponding GIS files including at least the GIS boundaries in vector form should also be sent to the Ramsar Secretariat.

10. Other information, for example on wetland types and land uses, whether vector- or raster-based, should be submitted on one or more separate layers at the highest resolution possible.

11. GIS boundaries are geo-referenced polygons of the Ramsar Site boundaries, prepared at the finest scale possible.. For Ramsar Sites made of several units, the boundaries of each unit should be stored as different records in the same GIS file.

12. The format should preferably follow the World Geodetic System (WGS) 1984 standard and should ideally be a shapefile (ESRI Corporation) but other formats, if easily convertible to shapefiles, are also acceptable. The formal name of the Ramsar Site (as given in RIS field 4) should be clearly given as an attribute in the attribute table and in the file name. The geographical coordinate system (projection system) is a mandatory part of the file metadata: the GIS file is useless without such information. The source of the GIS data, the resolution, the lineage process (whether from GPS, a digitized hardcopy map, from field surveys, etc.), i.e., the process that has been used to create the data, are other useful metadata to be provided, but not mandatory.

13. For Contracting Parties without access to GIS technology, if an International Organisation Partner (IOP) has supported the RIS preparation, it is recommended to contact that IOP to request help from their GIS staff. If this is not the case, please consult the Secretariat in advance of formally designating the Ramsar Site and submitting the RIS.

Scale of maps

14. The optimum scale for a map depends on the size of the site depicted. The optimal scales of maps for different sizes of Ramsar Sites are:

Size of site (ha)	**Preferred (minimum) scale of map**
>1,000,000	1:1,000,000
100,000 to 1,000,000	1:500,000
50,000 to 100,000	1:250,000
25,000 to 50,000	1:100,000
10,000 to 25,000	1:50,000
1,000 to 10,000	1:25,000
< 1,000	1:5,000

15. In summary, the map should be of suitable scale to depict the detail necessary to clearly indicate the features of the site described in the RIS and, particularly, to show a precise boundary.

16. For moderate to large sites, it is often difficult to show sufficient detail on standard A4 (210 mm x 297 mm) or Letter-format (8.5" x 11") sheets at the desired scale, so generally a sheet larger than this format is more appropriate. However, whenever possible, each map should be no larger than A3 (420 mm x 297 mm) as larger formats present difficulties for subsequent copying.

17. When the site is large or complex and/or when it is composed of several sub-sites with discrete boundaries, a finer-scale map of each section or sub-site should be provided, accompanied by a broader scale location map of the whole site which indicates the location of each sector or sub-site relative to the others. All such maps should follow the scale guidance above.

Boundary description (text)

18. A description of the boundaries of the site should be separately provided to accompany the map(s), indicating topographic and other legally defined national, regional, or international boundaries followed by the site boundaries, together with the relationship of the Ramsar Site boundary with the boundaries of any other existing protected area designations which cover part or all of the Ramsar Site.

19. If the precise position of the site boundary has been determined using a Global Positioning System (GPS), Contracting Parties are encouraged to include an electronic file listing each GPS latitude/longitude way-point determined and identifying these on the site map.

20. Where a revision to the boundary of a designated Ramsar Site is being made in accordance with Resolution VIII.21, *Defining Ramsar Site boundaries more accurately in Ramsar Information Sheets*, under the following circumstances:

    a) the site boundary has been drawn incorrectly and there has been a genuine error; and/or
    b) the site boundary does not accurately match the description of the boundary as defined in the RIS; and/or
    c) technology allows for a higher resolution and more accurate definition of the site boundary than was available at the time of Listing;

    any change should be made clear in the revised RIS and/or on the site map, and the reasons for such refinement should be documented in the RIS.

Good examples of maps

21. Examples of good quality Ramsar Site maps demonstrating desirable features noted above are available at www.ramsar.org/xxxxxxxxxxxxx [to be added].

Appendix D
Criteria for Identifying Wetlands of International Importance

Adopted by the 7th (1999) and 9th (2005) Meetings of the Conference of the Contracting Parties, superseding earlier Criteria adopted by the 4th and 6th Meetings of the COP (1990 and 1996), to guide implementation of Article 2.1 on designation of Ramsar Sites.

Group A of the Criteria. Sites containing representative, rare or unique wetland types

Criterion 1: A wetland should be considered internationally important if it contains a representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region.

Group B of the Criteria. Sites of international importance for conserving biological diversity

Criteria based on species and ecological communities

Criterion 2: A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.

Criterion 3: A wetland should be considered internationally important if it supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region.

Criterion 4: A wetland should be considered internationally important if it supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions.

Specific criteria based on waterbirds

Criterion 5: A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds.

Criterion 6: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of waterbird.

Specific criteria based on fish

Criterion 7: A wetland should be considered internationally important if it supports a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contributes to global biological diversity.

Criterion 8: A wetland should be considered internationally important if it is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.

Specific criteria based on other taxa

Criterion 9: A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one species or subspecies of wetland-dependent non-avian animal species.

Appendix E
Supplementary guidelines for identifying and designating particular wetland types

Peatlands, mangroves, and coral reefs were recognized by the *Global Review of Wetland Resources and Priorities for Wetland Inventory* report to COP7 (1999) as being amongst the wetland ecosystems that are most vulnerable and threatened by habitat loss and degradation, and thus in need of urgent priority action to ensure their conservation and wise use.

Additional guidance has been developed to provide clarification of aspects of the application of this Strategic Framework as they apply to peatlands, wet grasslands, mangroves, and coral reefs, karst and other subterranean wetland types, temporary pools, and bivalve (shellfish) reefs, in particular on the identification and designation of representative wetlands of these habitat types in accordance with Ramsar Criterion 1.

E1. Karst and other subterranean hydrological systems

1. The **Values** of karst wetlands are numerous. In accordance with Article 2.2 of the Ramsar Convention, "wetlands should be selected for the List on account of their international significance in terms of biology, botany, zoology, limnology or hydrology". From this perspective the principal wetland conservation values of karst and other subterranean hydrological systems include:

   a) uniqueness of karst phenomena/functions and functioning;
   b) inter-dependency and fragility of karst systems and their hydrological and hydrogeological characteristics;
   c) uniqueness of these ecosystems and endemism of their species;
   d) importance for conserving particular taxa of fauna and flora.

2. **Threats** can be generated within or outside of the karst area. In general terms, many "living" karst areas are wetlands, whether surface or subterranean. The subterranean systems are, in many cases, still well-preserved, but due to increasing development pressures they are becoming endangered. The pressures are both direct (visitors to caves, researchers) and indirect, including pollution of all kinds (particularly water pollution; dumping of solid waste, sewage; development of infrastructure, etc.), water abstraction, retention in reservoirs and other uses.

Values, importance and provision of ecosystem services

3. In addition to their many natural values, karst systems also have important socio-economic values, which include (but are not limited to) the supply of drinking water, water for grazing animals or agriculture, tourism and recreation. Karst wetland systems may play an especially vital role in ensuring adequate water supplies for human communities in generally dry surface landscapes.

4. Special consideration should be given to the cultural and socio-economic values of karst and other subterranean hydrological systems and to the fact that their "wise use" must be implemented at both national and local levels. A clear distinction is required between designation, management and monitoring of these wetlands.

Position within Ramsar's classification system

5. The Ramsar definition of wetlands (Article 1.1) should be read/understood to include surface and subterranean wetlands, although the Convention text does not explicitly refer to these systems.

Applying the Ramsar Criteria

6. Information provided for the purposes of Ramsar Site designation and management of subterranean wetlands should be according to:

    a) what is available (in many cases this may be limited, and subject to future research efforts); and

    b) what is appropriate for the scale being considered. For example, local and national management authorities should have access to the full range and detail of information available, whilst a summary will normally suffice for international purposes, notably completion of the Information Sheet on Ramsar Wetlands (RIS).

7. Ramsar designation should be considered as part of a mosaic of national and international instruments. In this way, the most representative part(s) of larger karst/subterranean systems might be designated under the Ramsar Convention, with land-use planning controls, etc., applied to achieve "wise use" of the whole system and its catchment area.

8. In applying the Ramsar Criteria for Identifying Wetlands of International Importance, special attention should be given to unique and representative hydrological, hydrogeological, biological and landscape values. In this regard, intermittent karst and thermal springs can be of special interest.

Boundaries and size

9. Site survey and mapping may present special problems and should be done according to practical possibilities. For example, a two-dimensional ground plan of subterranean features, projected against surface features, would suffice as a Ramsar Site map. It is recognized that many Contracting Parties will not have the resources to generate three-dimensional representations of subterranean sites, and the lack of such resources should not be a barrier to designation.

10. Optimal boundaries for karst/subterranean Ramsar Sites would cover whole catchments, but this is unlikely to be realistic in most cases. Site boundaries should, however, cover the areas which have the most significant direct or indirect impacts on the features of interest.

11. The flexible approach of the Convention allows countries to choose the most appropriate boundaries for national or site-specific situations. In particular, designation of either or both single cave and complex systems (for example, with surface and subterranean wetlands) can be envisaged.

Other considerations

12. To avoid confusion in **terminology**, the formulations "karst and other subterranean hydrological systems" and "subterranean wetlands" should be used throughout. Regardless of genesis, these terms should be used to include all subterranean cavities and voids with water (including ice caves). Such sites would be eligible for inclusion in the Ramsar List whenever the site selection Criteria are fulfilled. These terms should also clearly cover coastal, inland and human-made subterranean sites, following the broad approach of the Ramsar definition of "wetland" and thereby offering a high degree of flexibility for each Contracting Party.

13. The specialised technical terminology used to describe karst and other subterranean phenomena makes a glossary indispensable for non-experts. UNESCO's *Glossary and Multilingual Equivalents of Karst Terms* (UNESCO, 1972) can be used as a detailed source of reference, but a simplified glossary is proposed for Ramsar purposes and is provided in the Glossary (see Appendix G) under "Karst".

E2. Peatlands[10]

Geographic distribution and extent

14. Peatlands are ecosystems with a peat soil. Peat consists of at least 30% dead, partially decomposed plant remains that have accumulated *in situ* under waterlogged and often acidic conditions. Peatlands cover over 400 million hectares worldwide and occur from the high mountains to the sea, and from high to low latitudes.

15. Commonly, many habitats with peat soil are not recognized as "peatlands" even if their peat layer is thick enough. However, some peatland examples include polygonal tundra, salt marshes and mangroves, paludified forests and cloud forests, high-mountain paramos, and dambos and vleis. Peat may be formed by various kinds of vegetation: a) bryophytes, mainly *Sphagnum* mosses and associated herbaceous and dwarf shrub species; b) herbaceous plants such as sedges and grasses; and c) trees such as in alder *Alnus* spp. forests in the temperate zone and in peat swamp forests in the tropics.

Ecological functions, ecosystem services/benefits, and societal values

16. Two main types of peatland are distinguished: bogs, which are rainwater fed and therefore acid and nutrient poor, and fens, which are additionally groundwater fed and thus generally less acidic and more nutrient-rich than bogs. In this guidance the term "peatland" includes both peatland with active peat accumulation ("mire") and peatland that is no longer forming peat and may have lost peat forming vegetation and is degrading naturally or as a result of human intervention. Whereas the presence of peat is the defining characteristic of a peatland, vegetation and hydrology are key defining aspects of the peatland type.

17. Peatlands are important for the ecosystem functions and services they contribute to human well-being and to nature. The Common International Classification for Ecosystem Services

[10] This section provides revised guidelines for identifying and designating peatlands, adopted through Resolution XIII.12 Annex 1 (link), replacing and superseding the original guidelines adopted through Resolution XI.8.

(CICES)[11] , accepted by most Parties as being one relevant non-exclusive source for peatland evaluation for reporting in the Ramsar Information Sheet, distinguishes three main categories of ecosystem services:

a) Provisioning and supporting functions and services: for example, materials and energy, such as biodiversity, wild foods, drinking water and non-fossil and renewable biomass-based energy resources, as well as commercial development for food production;

b) Regulating functions and services: these relate to the maintenance of ecological conditions, such as climate regulation through carbon storage and sequestration, water regulation, maintenance of water quality through removal of pollutants and nutrients, prevention of saline water intrusion, and protection from disasters; and

c) Cultural values: provision of non-material benefits, such as opportunities for recreation and education, culture and heritage, spiritual and aesthetic experiences, and information and knowledge, e.g. from biogeochemical and palaeo-environmental archives.

Peatland degradation

18. The main factors causing peatland degradation locally and globally include: a) drainage; b) vegetation removal or disturbance; c) infrastructure development; d) peat extraction; e) eutrophication and pollution; f) acid rain; g) water abstraction and/or diversion, and h) fire. These factors, which can occur in the peatlands or in their zones of influence, have various consequences, which need to be taken into consideration when defining the boundaries of peatland Ramsar Sites and determining their management:

a) The main drivers of peatland drainage are agriculture and forestry both on peatlands and related catchments. Peatland hydrology may be influenced by hydrological changes (e.g. drainage, erosion and groundwater abstraction) in adjacent land. Peatland drainage leads to increased greenhouse gas (GHG) emissions (carbon dioxide from peat oxidation, methane from drainage ditches, nitrous oxide from nitrification), subsidence (reduction in peat thickness by oxidation and compaction) and increased fire risk. Drainage affects water regulation capacity, and therefore water security of downstream human communities and ecosystems. Many peatlands are located close to sea or river level and subsidence may result in increased and prolonged flooding and salt water intrusion, thereby affecting the ecological character of the peatland. If the peatland is located on acidic sulphate soils, drainage may result in very acidic runoff, rich in metals, that contaminates the waters downstream;

b) Vegetation removal or disturbance (e.g. by land use change) directly reduces biodiversity (flora, fauna, their distribution patterns and population resilience). It exposes the peat to direct solar radiation and wind, water and frost erosion, resulting in changes in micro-climate and desiccation of the surface peat and flooding risk in the surrounding areas;

[11] See: https://cices.eu/cices-structure.

c) Construction of infrastructure (e.g. roads, pipelines, buildings) on peat causes compaction by overburden and vehicles and requires drainage (often resulting in erosion and exacerbating draining in drier climates). This results in habitat and species loss, change in drainage patterns and compaction flooding in wet periods and increased fire risk in dry ones. Construction in permafrost areas may result in ice thawing, thermokarst, flooding and increased GHG emissions, especially of methane;

d) Peat extraction involves drainage and removal of peat (and vegetation), which reduces carbon storage and increases GHG emissions. There may also be local effects on water quality and regulation, and biodiversity, as well as aesthetic impacts potentially affecting the recreational potential;

e) Eutrophication (input of nutrients) is caused by direct on-site fertilization and atmospheric deposition, or (in fens) by input of nutrients in ground or surface water derived from the fertilizer added to surrounding landscape;

f) Acid rain deposition from industrial sources can severely affect wildlife;

g) Peatland fires have led to considerable damage of peatlands around the world, especially in drained and, thereby, dry peatlands, affecting vegetation and emitting in some cases large amounts of GHGs. Peatland fires and related haze have major economic impacts (for example, on transport, tourism, agriculture and forestry) and public health impacts;

h) Specific quantitative and qualitative criteria for classifying peatlands as degraded are to be determined by Contracting Parties based on scientific, legislative and national policy considerations.

Peatland restoration

19. Rewetting of peatlands means restoring the water table or hydrological regime towards a condition where the new ground water level is close to the surface of the peatland, with the aim of partial or total reversal of the effects of drainage. (Subsidence may have made original conditions impossible.)

20. Rewetting of drained peatland restores some ecosystem functions but full recovery may be difficult and a long-term objective. Rehabilitation of fauna and flora, for example, can take a long time, if it is achieved at all, and depends on the peatland type and species available. Some degraded peatlands can still provide ecosystem functions, for example fens that are used for traditional hay making, and former peat extraction fields that have been rewetted and are used for paludiculture. These peatlands may be degraded but can be included in a Ramsar Site designation if they form part of a mosaic that includes pristine peatlands.

21. In addition to peatland rewetting, active restoration techniques that reintroduce peatland plant species are important to restore the vegetation layer.

Position within Ramsar's classification system

22. Since peatlands are characterized by the presence of peat, whereas the Ramsar Classification System is based on vegetation, peatlands occur in most Ramsar Wetland Type categories, especially:

    a) Marine/coastal wetland, mainly under categories H (intertidal marshes), I (intertidal forested wetlands), J (coastal brackish/saline lagoons), and K (coastal freshwater lagoons);

    b) Inland wetland, under categories U (non-forested peatlands) and Xp (forested peatlands); and

    c) All other Inland wetland categories except Tp (permanent freshwater marshes/pools on inorganic soils), Ts (seasonal/intermittent freshwater marshes/pools – inorganic soils), W (shrub-dominated wetlands – inorganic soils), Xf (wooded swamps on inorganic soils) and Zk (b) (subterranean karst systems).

Applying the Ramsar Criteria

23. Peatlands considered for designation under Criterion 1 include pristine, peat-forming peatlands, some human-modified and naturally degrading peatlands that are no longer forming peat, and restored or rehabilitated peatlands that meet the criteria. They may consist of a mosaic of different peatland types with various levels of human impact.

24. Designation of peatlands as Ramsar Sites should pay special attention to peatland areas with at least some of the following attributes:

    a) Intact hydrology and peat-forming vegetation;

    b) Characteristic biodiversity;

    c) Large carbon store and active carbon sequestration;

    d) Well-developed and conserved historical archives of past environmental and human change;

    e) Unique macro- and/or micro-morphological features, such as complexes of peatland habitats or diverse micro-typography (e.g. hummocks and hollows); and/or

    f) Peatlands with high potential as "nature-based solutions" to reduce the risks of impacts related to climate change including climate change effects.

25. Special attention should be paid to the designation of vulnerable peatlands (for example, where minor impacts could lead to major degradation), to degraded peatlands with high potential for restoration and to peatlands that reduce the vulnerability of nearby human populations in the face of climate change. Criterion 2, which refers to vulnerable, endangered, or critically endangered species or threatened ecological communities, may be considered in this regard.

Application of Criterion 1 of the Application Guidelines with respect to carbon storage

26. As acknowledged in Resolutions XII.11 on *Peatlands, climate change and wise use: Implications for the Ramsar Convention* [and XIII.13 on *Restoration of degraded peatlands to mitigate and adapt to climate change and enhance biodiversity and disaster risk reduction*], peatlands are important carbon stores, for carbon sequestration and, in the case of restoration of degraded peatland, in reducing GHG emissions. Peatlands provide opportunities for awareness raising, communication and education. They can be used to demonstrate best practices for wise use and restoration. Peatlands for which the relevance of climate-change adaptation and mitigation is considered in the process of their designation as demonstration sites with respect to Criterion 1 would feature (some of) the following attributes:

    a) Large peat volume that can be preserved, always in proportion to the area of the territory of the Contracting Party, which makes the request/proposal;

    b) Information on the area's history, land use, hydrology, and peat volume, to enable assessment of the effects of restoration, as appropriate, on carbon store capacity and GHG fluxes to be used for communication and awareness raising; and

    c) Accessibility to provide site facilities that enable awareness-raising and education activities to be carried out on site.

Boundaries and size

27. Large peatlands should generally have higher priority for designation than small areas, because their hydrology, carbon stock and historical archives are easier to protect and because they incorporate macro-landscapes (see also Section 5.6 of the *Strategic Framework* on "Site delineation and boundary definition").

28. Safeguarding the hydrological integrity of peatlands designated as Ramsar Sites is critical to their long-term persistence. Site boundaries must be drawn in such a way as to prevent and eliminate as far as possible the impact of off-site hydrological changes on peatland hydrology.

29. Small peatlands can also be important for biodiversity, raising public awareness and providing education on the role of peatlands (see also paragraph 78 of the *Strategic Framework*).

30. Individual peatlands and complexes incorporating several peatland types (also with various levels of human impact) may qualify for designation (see also paragraph 91 of the *Strategic Framework* concerning site clusters).

The importance of peatland inventories

31. A peatland inventory should elaborate and/or collate key information for a wide range of conservation purposes including the designation of Ramsar Sites. A comprehensive overview of the extent, location and distribution of peatlands is necessary for each peatland inventory.

32. Ramsar guidance on wetland inventory (see Ramsar Handbooks 15 *Wetland Inventory* and 13 *Inventory, assessment and monitoring*) also applies to peatlands. According to this guidance, an inventory for the designation of peatlands as Ramsar Sites should use a hierarchy of four mapping scales in GIS format (multi-scale approach):

    a) The identification of peatland regions (at a scale from 1:500,000 to 1:1,000,000) using national and international information on bioclimatic and biogeographical ecoregions and landscape types (such as, for Europe, Moen *et al.* 2017[12]);

    b) Within the identified peatland regions, the assessment of location and rough extent of confirmed and probable peatlands (1:250,000 to 1:500,000);

    c) The validation of these data and the collection of supplementary field and literature data to characterize hydrology and vegetation (1:100,000 to 1:250,000) to determine representativeness, rareness, or uniqueness of peatlands under Criterion 1; and

    d) The mapping of habitats and management issues (1:10,000 to 1:50,000).

33. At all levels of analysis, the usefulness of the information must be assessed to determine if further data collection is necessary.

34. Parallel to this inventory, draft descriptions of specific peatlands in relation to Ramsar Criterion 2 should be prepared through evaluation of information on vulnerable, endangered, or critically endangered species or threatened ecological communities.

Further sources of information on peatlands

35. Much information on peatlands is available on the Internet. For successful information gathering, the use of appropriate search terms is important. Search terms should include any local term related to organic soil or peatland, combined with the country name (be aware of former country names which are no longer in use).

36. Soil data (including in manuscript form) might be available from soil institutions and other authorities. Since organic soils are subject to various kinds of land use, relevant information might be held by various national and regional authorities, including those responsible for geology, land development, environment, agriculture, forestry, resource extraction or energy. The information available from these authorities is sometimes of high resolution, often not available online, and must often be purchased.

37. Maps from digital archives (see below) are generally freely accessible and provide valuable information if geographic information system (GIS) data of appropriate resolution and accuracy are unavailable. Most maps are available as high-resolution images, which can be downloaded, geo-referenced and incorporated in GIS software. A large number of maps of the World Soil Survey Archive, the Sphaera library, and the Laboratory of Soil Science at Ghent University are not digitally available, but can be consulted at the archive sites themselves.

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[12] Joosten, H., Tanneberger, F. & Moen, A. (eds.) (2017) *Mires and Peatlands of Europe: Status, Distribution and Conservation*. Schweizerbart Science Publishers, Stuttgart.

38. Spatially explicit soil information of various spatial resolutions is available in the open access online archives listed below at Table 1.

Table 1: Open access soil information archives

Source	Website
International Soil Reference and Information Centre (ISRIC World Soil Information)	http://www.isric.org/
European Union Joint Research Centre	https://ec.europa.eu/jrc/en
FAO Corporate Document Repository	http://www.fao.org/documents/search/en/
Institute de Recherche pour le Développent : Base de données Sphaera du service Cartographie	http://www.cartographie.ird.fr/sphaera
World Soil Survey Archive and Catalogue (WOSSAC)	http://www.wossac.com
Perry-Castañeda Library Map Collection, University of Texas at Austin	http://www.lib.utexas.edu/maps/topo/
Ghent University Laboratory of Soil Science	http://www.labsoilscience.ugent.be/Congo
Commonwealth Scientific and Industrial Research Organization: Land Research Surveys	http://www.publish.csiro.au/nid/289/aid/16088
International Peatland Society: Publications	www.peatlands.org
International Mire Conservation Group: Publications	www.imcg.net/pages/publications/papers.php
Greifswald Mire Centre	http://greifswaldmoor.de/about-us.html
Wetlands International: Peatland Treasures	https://www.wetlands.org/our-approach/peatland-treasures/
Ramsar Recommendation 7.1: A global action plan for the wise use and management of peatlands	https://www.ramsar.org/document/recommendation-71-a-global-action-plan-for-the-wise-use-and-management-of-peatlands
Directory of Soil Institutions and soil experts in Africa	http://www.apipnm.org/swlwpnr/reports/y_sf/sftb221.htm
Canadian Peatland Inventory	http://ftp.geogratis.gc.ca/pub/nrcan_rncan/archive/vector/geology/Peatland/

39. More empirical supplementary data can be obtained from a wide range of sources, including publications and grey literature on: research and protection of wetlands, peatlands and organic soil; paleo-ecological, pedological, geological, hydrological and botanical research; expedition reports; technical reports by companies and environmental organizations; and incidental descriptions.

40. To locate data (including proxy data) on the occurrence of peatland and organic soil, relevant research institutes, ministries or agencies may be contacted. Data on organic soil are generally elaborated by and stored at various authorities, reflecting the multiple land uses applied on them. Relevant national authorities may include those for agriculture, forestry, resource extraction, geology, hydrology or environment. Considering the often very local terms for peatlands and organic soils, it is important to become familiar with local terms and concepts before contacting local authorities and researchers.

E3. Wet grasslands

Geographic distribution and extent

41. Wet grasslands occur throughout the world and are natural and near-natural ecosystems with a vegetation characterized and dominated by lower growing perennial grasses, sedges, reeds, rushes and/or herbs. They appear under periodically flooded or waterlogged conditions and are maintained through mowing, burning, natural or human-induced grazing, or a combination of these.

42. Wet grasslands include: floodplain grasslands, washlands, polders, water meadows, wet grasslands with (intensive) water level management, lakeside grasslands, vegetation dominated by relatively large, perennial, competitive herbs, and groundwater dependent dune slacks. These grasslands occur on different soils: heavy clay, loam, sand, gravel, peat, etc., and occur in freshwater, brackish and saline water systems.

43. Vegetation types that fall under this definition can appear in mosaic with one another or with other wetland types, such as peatlands, reedbeds, water-dependent shrubs, forests and others.

Ecological role and functions

44. Wet grasslands support specific biodiversity, comprising rare and threatened plant and animal species and communities, including internationally important bird populations, a range of mammals, invertebrates, reptiles and amphibians.

Values, importance and ecosystem services

45. In recent years there has been increasing awareness of the value of wet grasslands in performing hydrological and chemical functions, notably:

    a) flood alleviation - since wet grasslands can retain floodwater;
    b) groundwater recharge - wet grasslands retain water within a watershed enabling groundwater to be replenished; and
    c) water quality improvement - riparian wet grasslands retain nutrients, toxic substances and sediment, preventing them from entering watercourses.

46. Economic benefits accrue from these functions. When wet grasslands are destroyed, these functions are lost and have to be replaced at often enormous financial cost. These benefits include:

    a) water supply – wet grasslands can influence both water quantity and quality;
    b) health of freshwater fisheries – backwaters, ditches and other open water habitats within wet grassland areas are important for river fisheries;
    c) agriculture – floodplains provide some of the most fertile agricultural land; and
    d) recreation and sustainable tourism opportunities.

47. From an early stage in human history, floodplains have been subject to modifications. Since the industrial revolution, pressures on rivers and floodplains have increased significantly in many areas. As part of this process, wet grasslands have declined significantly in industrialized areas, but are also exposed to specific threats in other regions. This is being brought about by:

    a) changes in agricultural practices – increased drainage and use of fertilizer, change from hay-making to silage, re-seeding, herbicide use, conversion to arable land, higher stocking densities, neglect or abandonment, use of aquatic herbicides;

    b) land drainage – modification of natural hydrological regimes, isolation of floodplains from river flows, rapid evacuation of winter floods and early fall of spring water tables, maintenance of low water levels in drainage channels;

    c) abstraction for drinking water and crop irrigation – leading to lowered river flows and in-channel water levels, lowered water tables, exacerbation of drought-related problems;

    d) eutrophication – leading to changes in grassland plant communities and increased sward vigour;

    e) threats to coastal wet grasslands from sea-level rise and construction of flood defences;

    f) development and mineral extraction – leading to a decline of routinely flooded area and increased frequency of flooding of the remaining washland; and

    g) site fragmentation – leading to isolation of sites, threatening species restricted to wet grassland and vulnerable to extinction, and to problems with water level control and agricultural management.

Position within Ramsar's classification system

48. Wet grasslands are covered by the following wetland types of the Ramsar Classification System:

    a) They can occur as a *floodplain component*, under Ts (seasonal/intermittent freshwater marshes on inorganic soils, including seasonally flooded meadows and sedge marshes), and U (non-forested peatlands, including swamps and fens).

    b) They can occur as a *human-made* wetland type, under 3 (irrigated land, including irrigation channels and rice fields), and 4 (seasonally flooded agricultural land, including intensively managed or grazed wet meadow or pasture). Irrigation channels with natural vegetation cutting through wet meadows fulfil substantial ecological functions; they are therefore considered part of wet grasslands.

    c) *Wet grassland habitats* can also occur in other wetland types: E (sand, shingle or pebble shores including dune systems and humid dune slacks) and H (intertidal marshes, including salt meadows, raised salt marshes, tidal brackish and freshwater marshes).

They can also occur on the edges of other wetland types, such as J (coastal brackish/saline lagoons), N (seasonal/intermittent/irregular rivers/streams/creeks), P (seasonal/intermittent floodplain lakes), R (seasonal/intermittent saline/brackish/alkaline lakes and flats), and Ss (seasonal/intermittent saline/brackish/alkaline marshes).

Applying the Ramsar Criteria

49. A wet grassland should be considered for designation under Criterion 1 particularly if it performs specific hydrological functions.

50. Since wet grasslands are particularly dynamic ecosystems, special attention should be paid to the designation of those systems that, as part of river or coastal floodplains, are maintained by periodic floods or waterlogged conditions, either natural or human-induced, and demonstrate hydrological integrity.

51. Where wet grasslands are associated with agricultural or other management practices, special attention should be paid to the designation of systems whose ecological character is maintained through specific management measures or traditional forms of land and wetland resource uses (typically including induced grazing, mowing, or burning, or a combination of these), and whose continuation is critical to preventing gradual vegetation succession that may transform wet grasslands to tall reedbeds, peat bogs, or forested wetlands.

52. Many managed wet grasslands support important assemblages of breeding waterbirds and provide habitat for large populations of non-breeding waterbirds, and attention should be given to the designation under Criteria 4, 5 and 6 for these features.

E4. Mangroves

Geographic distribution and extent

53. Mangroves swamps are forested intertidal ecosystems that occupy sediment-rich sheltered tropical coastal environments, occurring from about 32º N (Bermuda, UK) to almost 39º S (Victoria, Australia). Around two-thirds to three-quarters of tropical coastlines are mangrove-lined.

Ecological role and functions

54. Mangrove swamps can form extensive and highly productive systems where there is adequate low-gradient topography, shelter, muddy substrates, and saline water with a large tidal amplitude.

55. Mangrove swamps are characterized by salt-tolerant woody plants with morphological, physiological, and reproductive adaptations that enable them to colonize littoral habitats. The term mangrove is used in at least two different ways:

    a) to refer to the ecosystem composed of these plants, associated flora, fauna and their physico-chemical environment; and

b) to describe those plant species (of different families and genera) that have common adaptations which allow them to cope with salty and oxygen-depleted (anaerobic) substrates.

56. Mangroves carry out critical landscape-level functions related to the regulation of fresh water, nutrients, and sediment inputs into marine areas. By trapping and stabilizing fine sediments they control the quality of marine coastal waters. They are also exceptionally important in maintaining coastal food webs and populations of animals that live as adults elsewhere and live within the mangrove at different stages of their life cycle, such as birds, fish, and crustaceans. Mangroves have an important role in pollution control through their absorptive capacity for organic pollutants and nutrients.

57. Mangroves are key ecosystems whose persistence is critical for the maintenance of landscape and seascape functions well beyond the boundaries of individual forests. Mangroves, coral reefs, and seagrass beds are among the best examples of integrated landscape-level ecosystems. When they occur together, they act as a unit, forming a complex mosaic of interrelated and integrated subsystems linked by physical and biological interactions. They play an important role in storm protection and coastal stabilization.

58. Worldwide, mangrove ecosystems support at least 50 species of mammals, over 600 species of birds, and close to 2,000 species of fish and shellfish, which include shrimps, crabs and oysters. Mangroves are also important for migratory birds and endangered species. A wide variety of species from other taxa make this a highly diverse community with a complex food web that is closely interlinked with adjacent ecosystems.

59. Mangroves are indispensable to the vitality and productivity of marine and estuarine finfish as well as shellfish fisheries. Globally, nearly two thirds of all fish harvested in the marine environment ultimately depend on the health of tropical coastal ecosystems, such as mangroves, seagrass beds, salt marshes and coral reefs, for maintenance of their stocks. The health and integrity of mangroves are critical to maintaining coastal zones and their cultural and heritage assets, and in buffering impacts due to climate change effects, including sea-level rise.

60. Mangroves differ from other forested systems in that they receive large inputs of matter and energy from both land and sea, and more organic carbon is produced than is stored and degraded. They display a high degree of structural and functional diversity, placing mangroves among the most complex ecosystems. Because of the diversity of goods and services provided by mangroves, they should not be managed as a simple forest resource.

61. A large proportion of the world's mangrove resource has been degraded by:

a) unsustainable exploitation practices, such as over-fishing, bark (tannin) extraction, charcoal and fuel wood production, and exploitation for timber and other products;
b) habitat destruction: worldwide, mangroves are threatened by clearing for agriculture, urban, tourism, and industrial development, and particularly to make aquaculture ponds;
c) changes in hydrology due to stream diversions for irrigation and dam construction, causing nutrient deprivation and hypersalinization; and

d) pollution, including industrial and sewage effluents and chronic or catastrophic oil spills.

62. Mangroves are particularly vulnerable to oil pollution and increased coastal erosion, sea-level rise, and natural events such as hurricanes, frosts, tsunamis, and human-induced climate change.

Values, importance and ecosystem services

63. Mangroves have played an important role in the economies of tropical countries for thousands of years, and constitute an important reservoir and refuge for many plants and animals. In tropical countries, mangrove ecosystems support extremely valuable subsistence, commercial and recreational fisheries, while also providing numerous other direct and indirect goods and services to society.

Position within Ramsar's classification system

64. Mangroves occur under *Marine/Coastal Wetlands*: I (Intertidal forested wetlands) in the Ramsar Classification System for Wetland Type.

Applying the Ramsar Criteria

65. In applying Ramsar Criterion 1 it should be recognized that mangroves occur in two broad biogeographic groups: an Indo-Pacific (Old World) group and a western African and American (New World) group, each with a characteristic but different species diversity.

66. Particular priority should be given to the designation of mangroves that form part of an intact and naturally functioning ecosystem which includes other wetland types, such as coral reefs, seagrass beds, tidal flats, coastal lagoons, salt flats, and/or estuarine complexes, since these are essential for maintaining the mangrove parts of the ecosystem. Under most circumstances, the mangrove, i.e., forested part of the site, should not be designated without inclusion of the other linked parts of the coastal ecosystem.

67. In determining the appropriate boundaries for site designation, consideration should be given to the following aspects:

a) inclusion of critical habitat patches, particular communities, or landforms to focus conservation and management actions;
b) provision for conservation actions within the human-dominated portion of the landscape, since a more benign human-dominated landscape can help alleviate negative edge effects;
c) provision for the conservation and wise use of large areas with relatively limited human access;
d) inclusion of whole landscape units (lagoon-estuarine complexes, salt flats, delta or mudflat/tidal flat systems);
e) the maintenance of hydrographical integrity and water quality, including in the context of catchment (river basin) management;
f) provision for the effects of sea-level rise and human-induced climate changes that may otherwise lead to loss of habitat and genetic processes; and

g) consideration of the possible landward migration of mangroves in response to sea-level rise.

68. In applying Criterion 1 to mangrove swamps, special attention should be given to the listing of areas which are in pristine condition or have biogeographic or scientific importance and protection needs.

69. Mangrove conservation should categorize units on the basis of the most appropriate use such as for protection; restoration; understanding and enjoyment of natural heritage, and conservation with emphasis on sustainable use. The minimum size of a site is that which contains the greatest diversity of habitat types, including habitats for endangered, threatened, rare, or sensitive species or biological assemblages. The "naturalness" should be considered when selecting candidate sites, i.e., the extent to which an area has been protected from or has not been subjected to human-induced change. The ecological, demographic and genetic processes should also be considered because these maintain the structural and functional integrity and self-sustaining capacity of the designated site.

70. For mangroves, particular attention should be paid to the application of Criteria 7 and 8 since mangrove systems are of critical importance as breeding and nursery areas for fish and shellfish, and Criterion 4 in recognition of the fact that because of their complex ecological, geomorphological and physical structure they can act as refuges, and are important for the persistence of populations of many migratory and non-migratory species. Designation of such areas should take into account that different habitats of coastal complexes of mangroves, seagrass beds, and coral reefs may be essential for different stages of a species' life-cycle.

Boundaries and size

71. Networks of sites have more value than individual small areas of mangroves, since they contribute to the integrity of whole landscapes and seascapes. Designations that encompass whole landscapes and seascapes are valuable tools to safeguard critical coastal processes, and consideration should be given, where possible, to Ramsar Site designations as part of a nested management framework for the coastal zone.

72. When defining the site boundaries, it must be considered that the more complex a system, the larger the site must be in order to be effective for conservation purposes. However, boundary definition becomes more critical the smaller the unit. If in doubt, the site should be made larger rather than smaller.

Further sources of information on mangroves

73. A wide range of geographical information on mangroves is available via the website of the UNEP-World Conservation Monitoring Centre (www.unep-wcmc.org/datasets-tools--reports_15.html). The 2010 World Atlas of Mangroves (Spalding *et al.* 2010) maps the global extent of mangroves.

E5. Coral reefs

Geographic distribution and extent

74. Coral reefs are massive carbonate structures built by the biological activity of the stony corals (true corals) and the associated complex assemblage of marine organisms that make up the coral reef ecosystem. They are found throughout the world's oceans on mud-free coastlines between latitudes 30°N and 30°S. Their estimated total area is 617,000 km^2, forming about 15% of the marine shallow shelves.

75. There are three general types of coral reefs: fringing reefs, barrier reefs, and atolls. Fringing reefs are found close against the coast; barrier reefs are separated from land by a lagoon; and atolls are ring-shaped coral reefs that enclose a lagoon and have been formed where an island (often volcanic in origin) has progressively sunk below the sea surface. However, coral reefs that develop on continental coastlines are often complex and contain features that are difficult to categorize.

76. Coral reef ecosystems may also occur as a veneer over non-reef substrata. Although geologically these are not "true" coral reefs, they have the same ecological attributes as other coral reefs, and are used by people in the same ways.

Ecological role and functions

77. In terms of sheer beauty of form, colours, and diversity of life, perhaps no other natural area of the world can compare with coral reefs. Coral reefs have the highest species diversity of all marine ecosystems and represent a significant contribution to global biodiversity. There are 4,000 known species of reef fish, and about 10% of these are restricted to island groups or a few hundred kilometres of shoreline. Despite forming a small fraction of marine systems of the world, nearly two thirds of all fish species harvested in the marine environment depend upon coral reefs and associated ecosystems, such as mangroves and seagrass beds.

Values, importance and provision of ecosystem services

78. Corals also provide a vital source of life-saving medicines, including anticoagulants and anticancer agents such as prostaglandins.

79. Coral reefs have been valuable to people for as long as communities have lived in coastal areas adjacent to warm seas. They have been exploited for food, building materials, medicines, and decorative objects, and continue to provide many of the basic needs of millions of people living in tropical coastal regions.

80. In tropical regions, coastal ecosystems and marine biodiversity contribute significantly to the economies of many countries. Coral reefs support tourism and recreation and subsistence, commercial and recreational fisheries. Some countries, including Barbados, the Maldives, and the Seychelles, rely on reef tourism for much of their foreign income. The Caribbean region alone receives over 100 million visitors per year, most of whom are destined for the beaches and reefs.

81. Coral reefs function as natural, self-repairing, and self-sustaining breakwaters, protecting the often low-lying land behind them from the effects of storms and rising sea levels. The

health and integrity of coral reefs are critical to maintaining tropical coastal zones and their cultural and heritage assets.

82. Despite their ecological and economic importance, coral reefs are in serious decline worldwide. They are threatened by numerous human actions that contribute to coral reef degradation, such as sediment, sewage, agriculture run-off and other pollution sources, mining, dredging of coastal areas, and coastal development. A strong correlation has been found between risk of degradation and coastal population density. The severe anthropogenic stresses from growing populations and their activities on the coastal zone are now coupled with die-offs due to coral diseases and epidemics affecting reef species. Over-fishing, blast fishing, fishing with poisons and souvenir collecting for national and international trade are major agents of reef destruction. Rising carbon dioxide levels may reduce the rate of calcification and reef formation.

83. A further and increasing impact on coral reefs is the effect of rising sea surface temperatures linked to global climate change. This causes the phenomenon of coral bleaching – expulsion of symbiotic algae, leading often to the death of the corals themselves with consequent loss of the diverse communities dependent upon them. Coral reefs that are already under stress from other human-induced pressures such as pollution and sediment deposition appear to be most vulnerable to bleaching. Predictions of future sea surface temperatures indicate that bleaching will become increasingly widespread and frequent. Recent results suggest that bleaching of corals by increased UV-B radiation may be adding to the effects of temperature.

84. Once corals have died, reefs are more vulnerable to physical break-up during storms, thus threatening their function in protecting coastal lands and their people from impacts of rising sea levels and storms. The massive worldwide coral bleaching in 1997-98 suggests that coral reefs maybe signaling the first ecosystem-scale damage from human-induced global change. Recovery will depend upon reducing human pressures through sound management and upon whether bleaching events will recur with increased severity and frequency, reversing any coral reef regeneration.

85. As a result of these interacting problems, coral reefs have suffered a dramatic decline in recent years. About 11% of the world's reefs sites have been lost, 27% are under immediate threat, and another 31% are likely to decline in the next 10 - 30 years. At greatest risk are the reefs in the wider Indian Ocean; Southeast and East Asia; the Middle East, mainly in the Arabian-Persian Gulf; and the Caribbean-Atlantic region.

86. Coral reefs support multi-species fisheries. Protected areas are now often used as a tool in fisheries management. Some economically important species may spend part of their life cycle outside the boundaries of the designated area, which should be taken into account in management. On the other hand, fisheries management measures support not only sustainable fisheries but also biodiversity and other valuable characteristics of the site. Many reef fish species need regulatory frameworks beyond the Ramsar Convention to complement Ramsar Site designation. These species need protection under complementary conservation frameworks and authorities.

87. In managing coral reefs, conservation needs must be considered along with the needs of local people who may depend on certain reefs for their livelihoods. Some areas are best

managed using multiple-use and zoning approaches that can accommodate the needs of different stakeholders. Nested protection frameworks at coastal zone level are required, as opposed to using schemes based on the strict protection of just a few areas. Coastal coral reef areas are best managed within the context of Integrated Coastal Zone Management (ICZM) programmes.

Position within Ramsar's classification system

88. Coral reefs falls under *Marine/Coastal Wetlands*: C (Coral reefs) in the Ramsar Classification System for Wetland Type.

89. In many places coral reefs form part of an ecosystem that is functionally and intricately linked to other adjacent marine habitats in the Ramsar Classification System, notably A (Permanent shallow marine waters), B (Marine subtidal aquatic beds – especially seagrass beds), E (Sand, shingle and pebble shores), H (Intertidal marshes), and J (Coastal brackish/saline lagoons).

Applying the Ramsar Criteria

90. Contracting Parties should pay special attention to the listing of coral reef areas that, because of their geographic location ("upstream-reefs"), are sources of pelagic larvae and ensure the seeding of large areas of reefs "downstream".

91. Reefs that buffer coastlines against storm damage, and so protect coastal populations and infrastructure, should also be considered for designation.

92. Consideration should be given to the listing of sites where there is a threat of degradation, and where listing can lead to comprehensive management actions that enhance maintenance of the ecological character of the coral reef.

93. An important consideration in the identification of coral reef sites for designation is the extent to which an area is unaffected by, and can be protected from, human-induced change that alters the quality of coastal waters, since the ecological character of the reefs will be maintained only if the water quality is preserved and coastal zones are appropriately managed.

94. In addition, consideration should be given also to the listing of sites that:

    a) support unusual geologic/biologic formations and/or species of fauna and flora of particular aesthetic, historic or scientific interest;

    b) have a history of documented long-term research and management by local and international institutions; and

    c) can be used for the establishment of long-term monitoring programmes for the assessment of environmental change.

95. Contracting Parties should pay special attention to the listing of coral reef areas that, because of their geographical location, are sources of larvae for other 'downstream' reefs, helping to maintain stable metapopulations of reef organisms over time.

96. The importance of coral reefs for fish species should be recognized through the application of Criteria 7 and 8. In applying Criterion 7 it should be noted that the fish species richness of reefs varies regionally, for example from more than 2,000 species in the Philippines to about 200 - 300 species in the Caribbean. Simple species counts (species inventories) are not sufficient to assess the importance of a particular area, and assessments must take into account the characteristics of the fish fauna in each region. Although endemism in coral reef fish is not common, some islands and shoals may be effectively isolated, with fish populations becoming genetically distinct. Such reef systems should be afforded a priority for listing.

97. Sites that support species of special conservation concern, unique biological assemblages, and flagship or keystone species (such as elkhorn coral forests, sponge and sea fan assemblages), and which are in pristine condition, should be a high priority for designation.

Boundaries and size

98. In determining the boundaries of a coral reef site to be designated, Contracting Parties should take into account Article 2.1 of the Convention. Since the outer parts of many coral reef systems as defined in paragraph 75 of this Appendix and the middle of some lagoon systems extend to below six metres water depth, boundaries of coral reefs sites should include all such parts of the reef. Moreover, since coral reef ecosystems as defined in paragraph 75 extend beyond the boundaries of the reef structure, and activities in adjacent areas can harm them, adjacent waters should, as appropriate, be included in the site designation.

99. The size of a designated coral reef site should be appropriate to the geographic scale of the reef and the management approaches necessary to maintain its ecological character. Wherever possible, the area should be large enough to protect an integral, self-sustaining ecological entity. In the sea, habitats are rarely precisely restricted, and it should be noted that many marine species have large ranges and that ocean currents can carry genetic materials of sedentary species over great distances.

100. Contracting Parties should consider, where appropriate, the listing of composite sites under Criterion 1 that include coral reefs and associated systems, in particular adjacent shallow reef flats, seagrass beds, and mangroves, which normally function as intricately linked ecosystems. The designated coral reef area should contain the greatest diversity of habitat types and successional stages possible, and also include the habitat types and successional stages of the associated systems.

101. Special attention should also be given to the listing of networks of sites rather than to individual reefs. Networks have more value than individual sites, contributing to the preservation of the integrity of whole seascapes.

Further sources of information on coral reefs

102. WCMC's *World Atlas of Coral Reefs* (Spalding *et al.* 2001) contains much relevant information.

E6. Temporary pools

Geographic distribution and extent

103. Temporary pools can occur in many different parts of the world, but are particularly well represented in karstic, arid, semi-arid, and mediterranean-type regions.

Ecological role and functions

104. Temporary pools are usually small (< 10 ha in area) and shallow wetlands which are characterized by an alternation of flooded and dry phases, and whose hydrology is largely autonomous. They occupy depressions, often endorheic, which are flooded for a sufficiently long period to allow the development of hydromorphic soils and wetland-dependent aquatic or amphibious vegetation and fauna communities. However, equally importantly, temporary pools dry out for long enough periods to prevent the development of the more widespread plant and animal communities characteristic of more permanent wetlands.

105. The water supply for temporary ponds usually comes from precipitation, from run-off from their often small and discrete catchment, and/or from the groundwater table. Temporary pools can also be important for groundwater recharge in karstic, arid and semi-arid areas.

106. Pools which are in direct physical contact with permanent, surface wetlands such as lake edges, permanent marshes or large rivers are excluded from this definition.

107. Significant and characteristic features of temporary pools include:

a) the ephemeral nature of their wet phase, normally with shallow waters, which means that they may not appear as obvious wetlands for most of the time;

b) their total dependence upon local hydrology, especially with the absence of any link to permanent aquatic habitats;

c) the uniqueness of their vegetation with, for example, typical communities of aquatic ferns *(Isoetes* species*, Marsilea* species*, Pilularia* species), normally endangered, and other amphibious plants such as *Ranunculus* species and *Calitriche* species;

d) the uniqueness of their invertebrate communities and a particular abundance of endangered faunal groups such as amphibians and branchiopod crustaceans, often due to the absence of fish as predators;

e) their particularly good representation in arid, semi-arid and mediterranean-type zones (including occurring as surface features in karst landscapes);

f) the human-made nature of many temporary pools in different parts of the world, created either as a result of extractive activities or for water retention and storage for use by local communities; and

g) their provision of nesting places for waterbirds.

108. Information on the sustainable management of temporary pools has been adopted by the Convention in Resolution VIII.33 (*Guidance for identifying, sustainably managing, and designating temporary pools as Wetlands of International Importance*).

Values, importance and provision of ecosystem services

109. Temporary ponds are often undervalued as wetlands because of their generally small size and seasonal or ephemeral nature, yet such wetlands can be of critical importance for the maintenance of biodiversity and as sources of water, food and other wetland products for local communities and indigenous peoples and their ways of life, particularly in arid and semi-arid areas and those which are vulnerable to persistent drought.

Position within Ramsar's classification system

110. Since temporary pools are defined by their size and their hydrological functioning, whilst the Ramsar Classification System for Wetland Type is based chiefly on vegetation, temporary pools are covered by a number of categories of wetland types in the Classification System:

a) they can occur as a *Marine/coastal wetland* under category E (Sand, shingle or pebble shores; includes sand bars, spits and sandy islets; includes dune systems and humid dune slacks);

b) they can occur as an *Inland wetland*, under categories N (Seasonal/ intermittent/ irregular rivers/streams/creeks), P (Seasonal/intermittent freshwater lakes (over 8 ha); includes floodplain lakes), Ss (Seasonal/intermittent saline/ brackish/alkaline marshes/pools), Ts (Seasonal/ intermittent freshwater marshes /pools on inorganic soils; includes sloughs, potholes, seasonally flooded meadows, sedge marshes), W (Shrub-dominated wetlands; shrub swamps, shrub-dominated freshwater marshes, shrub carr, alder thicket on inorganic soils), and Xf (Freshwater, tree-dominated wetlands; includes freshwater swamp forests, seasonally flooded forests, wooded swamps on inorganic soils); and

c) they can occur as a *Human-made wetland,* in category 2 (Ponds; includes farm ponds, stock ponds, small tanks; (generally below 8 ha)).

Applying the Ramsar Criteria

111. Ramsar Criteria 1 to 4 of the *Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance* are particularly relevant to the designation of temporary pools as Ramsar Sites. Because of their generally small size, temporary pools seldom regularly support sufficiently large numbers of waterbirds for Criteria 5 and 6 to

apply, although their importance for waterbirds in maintaining the biological diversity of the area can be recognized using Criterion 3, and as critical sites for waterbirds during their life cycle, particularly in arid and semi-arid regions, using Criterion 4. Most fish species do not occur in temporary ponds as they cannot generally survive their dry phases, but Criteria 7 and 8 may apply to temporary pools where they support fish species that are capable of survival in mud or in cysts during dry periods.

112. In applying Criterion 1, Contracting Parties should take into account the particular representation of temporary pools in karstic, arid or sub-arid (including Mediterranean-type) zones: this wetland type is particularly representative of these biogeographic regions.

113. In applying Criteria 2 and 4, it should be recognized that the characteristic plant and animal communities of temporary pools are:

    a) virtually dependent on this wetland type during at least part of, and often for all of, their life cycle; and

    b) very vulnerable by nature, being totally dependent on the very specific hydrological conditions of the pool: by altering the hydrology to drier or wetter conditions, whole plant and animal communities characteristic of temporary pools can be rapidly lost.

114. A number of species typical of temporary pools, for example aquatic ferns *(Isoetes* spp.*, Marsilea* spp.*, Pilularia* spp.), are globally or nationally threatened and listed in Protected Species Lists or Red Data Books. National key sites for such species are appropriate for consideration for designation under Criterion 2.

Boundaries and size

115. Contracting Parties should be aware that the importance of temporary pools is not linked to their size, and that important sites in terms of their contribution to global biodiversity can be only a few hectares, or even square meters, in size. See also guidance in section 5.6 above.

116. Where possible, temporary pools designated as Ramsar Sites should include their entire (usually small) catchments, so as to maintain their hydrological integrity.

117. Concerning the application of Criterion 4, it should be noted that temporary pools often occur as clusters or complexes of pools, sometimes involving hundreds of pools. In areas where rainfall is very localized, at any one time different pools may be dry or filled. When filled they may provide habitats for waterbird populations which move around the entire area. Such waterbird populations are thus dependent upon the whole cluster of pools rather than individual pools. Therefore, wherever possible, designation of a Ramsar Site should include the whole cluster of temporary pools, noting especially the guidance provided in the Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance concerning designating clusters of small sites and especially those in arid or semi-arid zones and of a non-permanent nature.

E7. Bivalve (shell-fish) reefs

(for reference citations see Section 10)

Geographic distribution and extent

118. Oyster reefs and mussel beds (i.e., bivalve reefs) have historically been a dominant ecological feature within estuaries, lagoons, sounds and other coastal embayments throughout the world's subtropical to temperate zones.

Ecological role and functions

119. Bivalve reefs – and oyster reefs in particular – provide many if not all of the ecological services that are commonly associated with other wetland types, and these services are increasingly being invoked as a basis for their restoration and protection (Coen *et al.* 2007; Beck *et al.* 2011). They contribute to nutrient cycling; provide structure that serves as foraging and nursery habitat for other species, including many commercial fisheries; stabilize subtidal and intertidal sediments; and in some instances, provide a structural defence against shoreline erosion. This latter function is of particular value in an era of accelerating sea-level rise. Because of the strong influence they can exert at scales ranging from meters to entire estuarine ecosystems, bivalve aggregations are often referred to as 'ecosystems engineers', modifying local environmental conditions in ways that influence their own growth and survival, as well as a myriad other species (Jones *et al.* 1994).

Values, importance and provision of ecosystem services

120. Using the Millennium Ecosystem Assessment's classification scheme for ecosystem services (MEA 2005), the most obvious ecosystem services provided by bivalve reefs are the *Provisioning* services. Bivalve reefs have long been harvested for food and mined as a mineral resource (e.g., combustion of shell for lime, as well as processing into fertilizer and feed additive). Globally, these extractive services have been almost the singular management focus for centuries, if not millennia. Unfortunately, there are few if any examples of sustainable management for these provisioning services, resulting in global declines of not only the bivalves but, perhaps more importantly, their broader ecological role as functional habitats (Kirby 2004; Lotze *et al.* 2006; Grabowski & Peterson 2007; Jackson 2008; Beck *et al.* 2011).

121. Bivalve reefs and beds provide a much broader array of ecosystem services that, until very recently, have not been particularly well recognized or – importantly – a management objective or conservation priority. Bivalves remove significant fractions of the suspended material ('seston') from waters flowing past their reefs (Grizzle *et al.* 2006) and in doing so can contribute significantly to sustaining good water quality (Cerrato *et al.* 1994). The organic material deposited into surrounding sediments as feces or pseudofeces is processed by bacteria, ultimately increasing rates of denitrification (Newell 2004).

122. Denitrification is a critically important *Regulating* ecosystem service in many estuaries where cultural eutrophication (Nixon 1995) has occurred. Nutrient management and, often, nutrient reduction strategies are increasingly common management objectives within estuarine watersheds and restoration, and conservation of oyster reefs has been invoked as a potentially valuable part of overall management strategy of these wetlands (Newell *et al.* 2005; Fulford *et al.* 2007; Cerco & Noel 2007).

123. A *Supporting* service is the provision of structured habitat for other organisms such as fish, crabs, sponges and other macroinvertebrates. As with coral reefs in tropical systems, and vegetated wetlands such as salt marshes, mangroves (Appendix E4 above), kelp forests and sea grasses, many species of fish and crustaceans use oyster reefs and mussel beds as a foraging ground or nursery habitat. Intact reefs can enhance the overall productivity of estuaries (Grabowski & Peterson 2007); conversely, the degradation of bivalve reef structure through destructive fishing practices, dredging or filling activities can cause cascading ecological impacts and increase the overall impact of hypoxia and anoxia (Newell 1988; Lenihan & Peterson 1999).

124. Shoreline protection is a service that is receiving increasing attention in regions where sea level rise is a concern for both human and ecological communities. Several studies have shown that oyster reefs in the intertidal zone have the potential to help mitigate the impact of sea level rise by stabilizing shorelines and reducing erosion of adjacent salt marsh wetlands (Meyer *et al.* 1997; Piazza *et al.* 2007).

Position within Ramsar's classification system

125. Oyster reefs and mussel beds fall largely within Marine/Coastal Wetlands: A - Permanent shallow marine waters (although, like coral reefs, some oyster reefs and mussel beds may also occur at depths greater than 6 m, and some parts are also intertidal).

126. Bivalve reefs fall under Marine/Coastal Wetlands: Ga (Bivalve (shellfish) reefs) in the Ramsar Classification System for Wetland Type. Bivalve reefs are also functionally linked to adjacent marine habitats in the Ramsar Classification System, notably A (Permanent shallow marine waters), B (Marine subtidal aquatic beds), F (Estuarine waters), G (Intertidal mud, sand or salt flats), and J (Coastal brackish/saline lagoons).

Applying the Ramsar Criteria

127. Contracting Parties should consider, where appropriate, the listing of composite sites under Criterion 1 that include bivalve reefs and associated systems, in particular adjacent mangroves, seagrass beds, and salt marshes which normally function as intricately linked ecosystems. The designated bivalve reef area should contain sufficient reef area to sustain populations of reef-forming bivalves and provide a full array of ecosystem services.

128. Special attention should be given to the listing of networks of sites rather than to individual reefs. Networks have more value than individual sites, contributing to the preservation and integrity of bivalve metapopulations as well as whole estuarine and lagoon ecosystems.

129. Contracting Parties should pay special attention to the listing of bivalve reef areas that, because of their geographical location, are sources of larvae for other 'downstream' reefs, helping to maintain stable bivalve metapopulations over time.

130. Bivalve reefs that buffer coastlines and protect coastal infrastructure against storm damage and anthropogenic waves resulting from commercial and recreational vessels should also be considered for designation.

131. Consideration should be given to the listing of sites where there is a threat of degradation, and where listing can lead to comprehensive management actions that enhance protection of the ecological character and benefits of the bivalve reefs.

Boundaries and size

132. Optimal Ramsar Site boundaries for bivalve reefs would extend beyond the reef structures themselves and include the necessary surrounding areas to ensure ecosystem function and larval dispersion and recruitment. This would likely include reef complexes and identification of local circulation patterns, as well as the underlying geomorphology of the basin. Oyster reefs in some estuaries, for example, can be long sinuous structures many kilometres in length and extending meters off the surrounding substrate. In other estuaries they form extensive 'patch reef' structures in open water away from channels or other bathymetric features. They can also be strongly associated with shorelines, forming fringing reefs that occur from the shallow subtidal zone to the upper intertidal zone.

133. In many locations, their reef structures occur perpendicular to the predominant tidal flow, creating turbulent mixing that brings food and other suspended organic materials into contact with the bivalve reef and enhances their feeding efficiency (McCormick-Ray 1998, 2005). Ultimately, the overall biomass of bivalves in a coastal embayment and, hence, the physical extent of reefs is driven by primary productivity and availability of food resources to support the population in an ecosystem context (Dame 1996; Mann *et al.* 2009).

E8. Artificial wetlands

Applying the Ramsar Criteria

134. Article 1.1 of the Convention states that "for the purpose of this Convention wetlands are 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."

135. Many existing Ramsar Sites are artificial (in whole or in part) inasmuch as they are human-made wetlands which have, in some parts of the world and especially in anthropogenic landscapes, developed international importance for biodiversity in the period following their creation.

136. However, within the legal context of the Convention, the fact that some artificial wetlands may eventually develop importance for biodiversity should never be used as justification for the destruction, substantial modification, or conversion of natural or near-natural wetlands at a location.

137. Ramsar Site designation Criterion 1 cannot be applied to artificial wetlands, since it specifies application exclusively to "natural or near-natural" wetland types. All other Criteria can, as appropriate, be applied to artificial wetlands.

Appendix F
Explanation of the categories of "Factors (actual or likely) adversely affecting the site's ecological character" (RIS field 30)

Factors adversely affecting the site's ecological character		
Human settlements (non-agricultural)		**human settlements or other non-agricultural land uses with a substantial footprint**
	Housing & urban areas	human cities, towns, & settlements including non-housing development typically integrated with housing *urban areas, suburbs, villages, vacation homes, shopping areas, offices, schools, hospitals*
	Commercial & industrial areas	factories & other commercial centers *manufacturing plants, shopping centers, office parks, military bases, power plants, train & ship yards, airports*
	Tourism & recreation areas	tourism & recreation sites with a substantial footprint *ski areas, golf courses, beach resorts, cricket fields, county parks, campgrounds*
	Unspecified development	
Agriculture & aquaculture		**threats from farming & ranching as a result of agricultural expansion & intensification, including silviculture, mariculture, & aquaculture**
	Annual & perennial non-timber crops	crops planted for food, fodder, fiber, fuel, or other uses *farms, household swidden plots, plantations, orchards, vineyards, mixed agroforestry systems*
	Wood & pulp plantations	stands of trees planted for timber or fiber outside of natural forests, often with non-native species, *teak or eucalyptus plantations, silviculture, christmas tree farms*
	Livestock farming & ranching	domestic terrestrial animals raised in one location on farmed or nonlocal resources (farming); also domestic or semi-domesticated animals allowed to roam in the wild & supported by natural habitats (ranching) *cattle feed lots, dairy farms, cattle ranching, chicken or duck farms, goat, camel, or yak herding*
	Marine & freshwater aquaculture	aquatic animals raised in one location on farmed or nonlocal resources; also hatchery fish allowed to roam in the wild *shrimp or fin fish aquaculture, fish ponds on farms, hatchery salmon, seeded shellfish beds, artificial algal beds*
	Non specified	
Energy production & mining		**threats from production of non-biological resources**
	Oil & gas drilling	exploring for, developing, & producing petroleum & other liquid hydrocarbons *oil wells, deep sea natural gas drilling*
	Mining & quarrying	exploring for, developing, & producing minerals & rocks *coal mines, alluvial gold panning, gold mines, rock quarries, coral mining, deep sea nodules, guano harvesting*

	Renewable energy	exploring, developing, & producing renewable energy *geothermal power production, solar farms, wind farms (including birds flying into wind turbines), tidal farms*
	Unspecified	
Transportation & service corridors		**threats from long, narrow transport corridors & the vehicles that use them including associated wildlife mortality**
	Roads & railroads	surface transport on roadways & dedicated tracks *highways, secondary roads, logging roads, bridges & causeways, road kill, fencing associated with roads, railroads*
	Utility & service lines (e.g., pipelines)	transport of energy & resources *electrical & phone wires, aqueducts, oil & gas pipelines, electrocution of wildlife*
	Shipping lanes	transport on & in freshwater & ocean waterways *dredging, canals, shipping lanes, ships running into whales, wakes from cargo ships*
	Aircraft flight paths	air & space transport *flight paths, jets impacting birds*
	Unspecified	
Biological resource use		**threats from consumptive use of "wild" biological resources including deliberate & unintentional harvesting effects; also persecution or control of specific species**
	Hunting & collecting terrestrial animals	killing or trapping terrestrial wild animals or animal products for commercial, recreation, subsistence, research or cultural purposes, or for control/persecution reasons; includes accidental mortality/bycatch *bushmeat hunting, trophy hunting, fur trapping, insect collecting, honey or bird nest hunting, predator control, pest control, persecution*
	Gathering terrestrial plants	harvesting plants, fungi, & other non-timber/non-animal products for commercial, recreation, subsistence, research or cultural purposes, or for control reasons *wild mushrooms, forage for stall fed animals, orchids, rattan, control of host plants to combat timber diseases*
	Logging & wood harvesting	harvesting trees & other woody vegetation for timber, fiber, or fuel *clear cutting of hardwoods, selective commercial logging of ironwood, pulp operations, fuel wood collection, charcoal production*
	Fishing & harvesting aquatic resources	harvesting aquatic wild animals or plants for commercial, recreation, subsistence, research, or cultural purposes, or for control/persecution reasons; includes accidental mortality/bycatch *trawling, blast fishing, spear fishing, shellfish harvesting, whaling, seal hunting, turtle egg collection, live coral collection, seaweed collection*
	Unspecified	
Human intrusions & disturbance		**threats from human activities that alter, destroy & disturb habitats & species associated with non-consumptive uses of biological resources**

	Recreational & tourism activities	people spending time in nature or traveling in vehicles outside of established transport corridors, usually for recreational reasons *off-road vehicles, motorboats, jet-skis, snowmobiles, ultralight planes, dive boats, whale watching, mountain bikes, hikers, birdwatchers, skiers, pets in rec areas, temporary campsites, caving, rock-climbing*
	(Para)military activities	actions by formal or paramilitary forces without a permanent footprint *armed conflict, mine fields, tanks & other military vehicles, training exercises & ranges, defoliation, munitions testing*
	Unspecified/others	people spending time in or travelling in natural environments for reasons other than recreation or military activities *law enforcement, drug smugglers, illegal immigrants, species research, vandalism*
Natural system modifications		**threats from actions that convert or degrade habitat in service of "managing" natural or seminatural systems, often to improve human welfare**
	Fire & fire suppression	suppression or increase in fire frequency and/or intensity outside of its natural range of variation *fire suppression to protect homes, inappropriate fire management, escaped agricultural fires, arson, campfires, fires for hunting*
	Dams & water management/use	changing water flow patterns from their natural range of variation either deliberately or as a result of other activities *dam construction, dam operations, sediment control, change in salt regime, wetland filling for mosquito control, levees & dikes, surface water diversion, groundwater pumping, channelization, artificial lakes*
	Unspecified/others	other actions that convert or degrade habitat in service of "managing" natural systems to improve human welfare *land reclamation projects, abandonment of managed lands, rip-rap along shoreline, mowing grass, tree thinning in parks, beach construction, removal of snags from streams*
Invasive & other problematic species & genes		**threats from non-native & native plants, animals, pathogens/microbes, or genetic materials that have or are predicted to have harmful effects on biodiversity following their introduction, spread and/or increase in abundance**
	Invasive non-native/alien species	harmful plants, animals, pathogens & other microbes not originally found within the ecosystem(s) in question & directly or indirectly introduced & spread into it by human activities *feral cattle, household pets, zebra mussels, Dutch elm disease or chestnut blight, Miconia tree, introduction of species for biocontrol, Chytrid fungus affecting amphibians outside of Africa*
	Problematic native species	harmful plants, animals, or pathogens & other microbes that are originally found within the ecosystem(s) in question, but have become "out of balance" or "released" directly or indirectly due to human activities *overabundant native deer, overabundant algae due to loss of native grazing fish, native plants that hybridize with other plants, plague affecting rodents*

	Introduced genetic material	Human-altered or transported organisms or genes *pesticide resistant crops, hatchery salmon, restoration projects using nonlocal seed stock, genetically modified insects for biocontrol, genetically modified trees, genetically modified salmon*
	Unspecified	
Pollution		**threats from introduction of exotic and/or excess materials or energy from point & nonpoint sources**
	Household sewage, urban waste water	water-borne sewage & nonpoint runoff from housing & urban areas that include nutrients, toxic chemicals and/or sediments *discharge from municipal waste treatment plants, leaking septic systems, untreated sewage, outhouses, oil or sediment from roads, fertilizers & pesticides from lawns & golf-courses, road salt*
	Industrial & military effluents	water-borne pollutants from industrial & military sources including mining, energy production, & other resource extraction industries that include nutrients, toxic chemicals and/or sediments *toxic chemicals from factories, illegal dumping of chemicals, mine tailings, arsenic from gold mining, leakage from fuel tanks, PCBs in river sediments*
	Agricultural & forestry effluents	water-borne pollutants from agricultural, silvicultural, & aquaculture systems that include nutrients, toxic chemicals and/or sediments including the effects of these pollutants on the site where they are applied *nutrient loading from fertilizer runoff, herbicide runoff, manure from feedlots, nutrients from aquaculture, soil erosion*
	Garbage & solid waste	rubbish & other solid materials including those that entangle wildlife *municipal waste, litter from cars, flotsam & jetsam from recreational boats, waste that entangles wildlife, construction debris*
	Air-borne pollutants	atmospheric pollutants from point & nonpoint sources *acid rain, smog from vehicle emissions, excess nitrogen deposition, radioactive fallout, wind dispersion of pollutants or sediments, smoke from forest fires or wood stoves*
	Excess heat, sound, light	inputs of heat, sound, or light that disturb wildlife or ecosystems *noise from highways or airplanes, sonar from submarines that disturbs whales, heated water from power plants, lamps attracting insects, beach lights disorienting turtles, atmospheric radiation from ozone holes*
	Unspecified	
Geological events		
	Volcanoes	volcanic events *eruptions, emissions of volcanic gasses*
	Earthquakes/tsunamis	earthquakes & associated events *earthquakes, tsunamis*
	Avalanches/landslides	avalanches or landslides *avalanches, landslides, mudslides*
	Unspecified	
Climate change & severe weather		**long-term climatic changes that may be linked to global warming & other severe climatic or weather events outside the natural range of variation that could wipe out a vulnerable species or habitat**

	Habitat shifting & alteration	major changes in habitat composition & location *sea-level rise, desertification, tundra thawing, coral bleaching*
	Droughts	periods in which rainfall falls below the normal range of variation *severe lack of rain, loss of surface water sources*
	Temperature extremes	periods in which temperatures exceed or go below the normal range of variation *heat waves, cold spells, oceanic temperature changes, disappearance of glaciers/sea ice*
	Storms & flooding	extreme precipitation and/or wind events or major shifts in seasonality of storms *thunderstorms, tropical storms, hurricanes, cyclones, tornados, hailstorms, ice storms or blizzards, dust storms, erosion of beaches during storms*
	Unspecified	
Other (please name)		
No threats		
No information available		

Appendix G
Glossary of terms used in the Strategic Framework

adverse conditions (Criterion 4) - ecological conditions unusually hostile to the survival of plant or animal species, such as occur during severe weather like prolonged drought, flooding, cold, etc.

appropriate (Criterion 1) - when applied to the term "biogeographic region" as here, this means the regionalization which is determined by the Contracting Party to provide the most scientifically rigorous approach possible at the time.

biogeographical population - several types of 'populations' are recognized:

i) the entire population of a monotypic species;
ii) the entire population of a recognized subspecies;
iii) a discrete migratory population of a species or subspecies, i.e., a population which rarely if ever mixes with other populations of the same species or subspecies;
iv) that 'population' of birds from one hemisphere which spend the non-breeding season in a relatively discrete portion of another hemisphere or region. In many cases, these 'populations' may mix extensively with other populations on the breeding grounds, or mix with sedentary populations of the same species during the migration seasons and/or on the non-breeding grounds;
v) a regional group of sedentary, nomadic or dispersive birds with an apparently rather continuous distribution and no major gaps between breeding units sufficient to prohibit interchange of individuals during their normal nomadic wanderings and/or post-breeding dispersal.

Guidance on waterbird biogeographical populations (and, where data is available, suggested 1% thresholds for each population) is provided by Wetlands International, most recently in the *Waterbird Population Estimates*, with more detail for Anatidae populations in Africa and western Eurasia given in Scott & Rose (1996).

biogeographic region (Criteria 1 & 3) - a scientifically rigorous determination of regions as established using biological and physical parameters such as climate, soil type, vegetation cover, etc. Note that for non-island Contracting Parties, in many cases biogeographic regions will be transboundary in nature and will require collaboration between countries to establish representative, unique, etc., wetland types. In some cases, the term bioregion is used synonymously with biogeographic region. In some circumstances, the nature of biogeographic regionalization may differ between wetland types according to the nature of the parameters determining natural variation.

biological diversity (Criteria 3 & 7) – 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 (genetic diversity), between species (species diversity), of ecosystems (ecosystem diversity), and of ecological processes. (This definition is largely based on the one contained in Article 2 of the Convention on Biological Diversity.)

change in ecological character - for the purposes of implementation of Article 3.2, the human-induced adverse alteration of any ecosystem component, process, and/or ecosystem benefit/service. (Resolution IX.1 Annex A)

critically endangered (Criterion 2) - as used by the Species Survival Commission of IUCN. A taxon is Critically Endangered when it is facing an extremely high risk of extinction in the wild in the immediate future, as defined [for both animals and plants by the criteria layed out in the *IUCN Red List Categories and Criteria: Version 3.1.*(IUCN 2001)] See also 'globally threatened species' below.

critical stage (Criterion 4) - meaning stage of the life cycle of wetland-dependent species. Critical stages being those activities (breeding, migration stopovers etc.) which if interrupted or prevented from occurring may threaten long-term conservation of the species. For some species (Anatidae for example), areas where moulting occurs are vitally important.

ecological character - the combination of the ecosystem components, processes and benefits/services that characterise the wetland at a given point in time. [Within this context, ecosystem benefits are defined in accordance with the MA definition of ecosystem services as "the benefits that people receive from ecosystems".] (Resolution IX.1 Annex A)

ecological communities (Criterion 2) - any naturally occurring group of species inhabiting a common environment, interacting with each other especially through food relationships and relatively independent of other groups. Ecological communities may be of varying sizes, and larger ones may contain smaller ones.

ecotone (Criterion 2) – a narrow and fairly sharply defined transition zone between two or more different communities. Such edge communities are typically rich in species.

endangered (Criterion 2) - as used by the Species Survival Commission of IUCN. A taxon is Endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future, as defined [for both animals and plants by the criteria layed out in the *IUCN Red List Categories and Criteria: Version 3.1.*(IUCN 2001)]. See also 'globally threatened species' below.

endemic species (Criterion 7) - a species that is unique to one biogeographical region, i.e., it is found nowhere else in the world. A group of fishes may be indigenous to a subcontinent with some species endemic to a part of that subcontinent.

endorheic - a water body which loses water only by evaporation, i.e. no stream or river flows from it.

family (Criterion 7) - an assemblage of genera and species that have a common phylogenetic origin, e.g., pilchards, sardines and herrings in the family *Clupeidae*

fish (Criterion 7) - any finfish, including jawless fishes (hagfishes and lampreys), cartilaginous fishes (sharks, rays, skates and their allies, *Chondrichthyes*) and bony fishes (*Osteichthyes*) as well as certain shellfish or other aquatic invertebrates (see below).

fishes (Criterion 8) - "fishes" is used as the plural of "fish" when more than one species is involved.

Fish orders that typically inhabit wetlands (as defined by the Ramsar Convention) and which are indicative of wetland benefits, values, productivity or biological diversity, include:

i) **Jawless fishes - *Agnatha***
- hagfishes (*Myxiniformes*)
- lampreys (*Petromyzontiformes*)

ii) **Cartilaginous fishes - *Chondrichthyes***
- dogfishes, sharks and allies (*Squaliformes*)
- skates (*Rajiformes*)
- stingrays and allies (*Myliobatiformes*)

iii) **Bony fishes - *Osteichthyes***
- Australian lungfish (*Ceratodontiformes*)
- South American and African lungfishes (*Lepidosireniformes*)
- bichirs (*Polypteriformes*)
- sturgeons and allies (*Acipenseriformes*)
- gars (*Lepisosteiformes*)
- bowfins (*Amiiformes*)
- bonytongues, elephant fishes and allies (*Osteoglossiformes*)
- tarpons, bonefishes and allies (*Elopiformes*)
- eels (*Anguilliformes*)
- pilchards, sardines and herrings (*Clupeiformes*)
- milkfishes (*Gonorhynchiformes*)
- carps, minnows and allies (*Cypriniformes*)
- characins and allies (*Characiformes*)
- catfishes and knifefishes (*Siluriformes*)
- pikes, smelts, salmons and allies (*Salmoniformes*)
- mullets (*Mugiliformes*)
- silversides (*Atheriniformes*)
- halfbeaks (*Beloniformes*)
- killifishes and allies (*Cyprinodontiformes*)
- sticklebacks and allies (*Gasterosteiformes*)
- pipefishes and allies (*Syngnathiformes*)
- cichlids, perches and allies (*Perciformes*)
- flatfishes (*Pleuronectiformes*)

iv) **Several groups of shellfishes:**
- shrimps, lobsters, freshwater crayfishes, prawns and crabs (*Crustacea*)
- mussels, oysters, pencil baits, razor shells, limpets, winkles, whelks, scallops, cockles, clams,

- abalone, octopus, squid and cuttlefish (*Mollusca*)

v) **Certain other aquatic invertebrates:**

- sponges (*Porifera*)
- hard corals (*Cnidaria*)
- lugworms and ragworms (*Annelida*)
- sea urchins and sea cucumbers (*Echinodermata*)
- sea squirts (*Ascidiacea*)

fish stock (Criterion 8) - the potentially exploitable component of a fish population.

flagship species - species that appeal to the public and have other features that make them suitable for communicating conservation concerns.

flyway (Guideline for Criterion 2) - the concept developed to describe areas of the world used by migratory waterbirds and defined as the migration routes(s) and areas used by waterbird populations in moving between their breeding and wintering grounds. Each individual species and population migrates in a different way and uses a different suite of breeding, migration staging and wintering sites. Hence a single flyway is composed of many overlapping migration systems of individual waterbird populations and species, each of which has different habitat preferences and migration strategies. From knowledge of these various migration systems it is possible to group the migration routes used by waterbirds into broad flyways, each of which is used by many species, often in a similar way, during their annual migrations. Recent research into the migrations of many wader or shorebird species, for example, indicates that the migrations of waders can broadly be grouped into eight flyways: the East Atlantic Flyway, the Mediterranean/Black Sea Flyway, the West Asia/Africa flyway, the Central Asia/Indian sub-continent Flyway, the East Asia/Australasia Flyway, and three flyways in the Americas and the Neotropics.

There are no clear separations between flyways, and their use is not intended to imply major biological significance; rather it is a valuable concept for permitting the biology and conservation of waterbirds, as with other migratory species, to be considered in broad geographical units into which the migrations of species and populations can be more or less readily grouped.

globally threatened species (Criteria 2, 5 & 6) - species or subspecies which are listed by IUCN Species Survival Commission's Specialist Groups or Red Data Books as either Critically Endangered, Endangered or Vulnerable. Note that, especially for invertebrate taxa, IUCN's Red Data listings may be both incomplete and dynamic, reflecting poor knowledge of the global status of many taxa. Interpretation of the terms 'vulnerable', 'endangered' or 'critically endangered' species should thus always be undertaken at a national level in the light of the best available scientific knowledge of the status of the relevant taxa.

hydromorphic soils - waterlogged soils which develop under conditions of poor drainage in marshes, swamps, seepage areas, or flats.

importance (long-term target for Criterion 2) - sites, the protection of which will enhance the local and thus global long-term viability of species or ecological communities.

indicator species - species whose status provides information on the overall condition of the ecosystem and of other species in that ecosystem; taxa that are sensitive to environmental conditions and which can therefore be used to assess environmental quality.

indigenous species (Criterion 7) - a species that originates and occurs naturally in a particular country.

introduced (non-native) species - a species that does not originate or occur naturally in a particular country.

karst (see Appendix E1) - a landscape created on soluble rock with efficient underground drainage. Karst is characterised by caves, dolines, a lack of surface drainage and is mainly, but not exclusively, formed on limestone. The name derives from Kras - the Classical Karst from Slovenia. In this original, temperate, karst the dominant landforms are dolines, but contrasting landscapes are the pinnacle, cone, and tower karsts of the tropics, and the fluviokarst and glaciokarst of colder climates. The term "kras" originally denoted bare, stony ground in the Slovene language.

The following subsection of the Glossary is related to Karst.

Allogenic drainage: karst drainage that is derived from surface run-off that originates on adjacent impermeable, rocks. Also known as allochthonous drainage.
Aquiclude: relatively impermeable rock acting as the boundary to an aquifer.
Aquifer: a water-bearing horizon, sufficiently permeable to transmit groundwater and yield such water to wells and springs.
Aquitard: a bed of rock that retards, but does not totally inhibit, the movement of water into or out of an aquifer.
Artesian flow: flow through a confined aquifer where the entire aquifer is saturated and the flow is under hydrostatic pressure.
Autogenic drainage: karst drainage that is derived entirely by absorption of meteoric water into the karst rock surface. Also known as autochthonous drainage.
Backflooding: flooding due to backup of excess flow behind a constriction in a major conduit.
Bedding plane: a depositional lamination in sedimentary rocks.
Bedding plane cave: cave passages guided by bedding.
Blind valley: a valley that terminates where its stream sinks, or once sank, underground.
Breakdown: Synonym for the collapse of caves, or, in American usage, for the debris produced by collapse.
Calcium carbonate: naturally occurring compound with the chemical formula $CaCO_3$, the major component of carbonate rocks including limestone and marble.
Carbonate rock: a rock consisting of one or more carbonate minerals.
Cave: A natural hole in the ground, large enough for human entry. This does not include hydrologically very significant, conduits or fissures. A cave may be a single, short length of accessible passage, or an extensive and complex network of tunnels as long as the hundreds of kilometers in the Flint Mammoth Cave System. Most caves are formed by dissolution in limestone but sandstone caves, lava caves, glacier caves and tectonic caves also occur. In some countries a cave is regarded as being a horizontal

opening, as opposed to a pothole, or jama, which is a vertical opening, or natural vertical shaft.

Cave lake: any underground lake, it may be the entrance to a sump, in vadose caves formed by ponding behind banks of sediment or gour barriers.

Chamber: an enlargement in a cave passage or system. The largest chamber currently known, Sarawak Chamber in Sarawak, is over 700m long, up to 400m wide and 70m high.

Classical Karst: the region called Kras in Slovenia, which gave its name to the karst landscape.

Conduit: dissolutional voids, including enlarged fissures and tubular tunnels; in some usage the term is restricted to voids that are water-filled.

Conduit flow: underground water flow within conduits.

Corrosion: the erosion of rock by chemical activity that leads to dissolution.

Doline: a circular closed depression, saucershaped, conical or in some cases cylindrical. Dolines may form by dissolution, collapse, or a combination of these. They are ubiquitous features of limestone karst, but can form in or above any soluble rock; subsidence dolines are developed in insoluble sediment leached or collapsed into an underlying cavernous limestone. The largest dolines in Slovenia, Smrekova draga for instance, are more than 1 km long and over 100m deep.

Dry valley: valley without a permanent surface stream. It became dry when underground drains formed or were re-opened.

Entrenchment: erosion by a freely flowing stream to form a canyon.

Estavelle: opening that acts as either a sinkhole or a spring, depending upon groundwater level.

Floodwater zone: the zone through which the level of the water table fluctuates, also epiphreatic zone.

Freshwater lens: fresh groundwater found beneath permeable limestone islands or peninsular land masses. It is limited by a water table above and below by a mixing zone between fresh and saline groundwater along the halocline.

Gour: pool formed by calcite deposition. Gours can grow into large dams many metres high and wide. Travertine, gours form in the open air.

Groundwater: a subsurface water that lies below the water table in the saturated or phreatic zone.

Gypsum: mineral or rock composed of the hydrated calcium sulphate, $CaSO_4 .2H_20$.

Gypsum cave: gypsum is very soluble and vadose and phreatic caves can form in it. Largest caves are in the Podolie region of the Ukraine, where the Optimisticeskaja only has around 180km of passage.

Halocline: the interface between fresh groundwater and saline groundwater.

Hydraulic gradient: the slope of the water table in an aquifer.

Ice cave: a cave in rock filled with permanent ice.

Input point: the start of underground drainage route or aquifer.

Limestone: sedimentary rock containing at least 50% calcium carbonate by weight.

Meteoric water: water that originates from any form of atmospheric precipitation.

Moonmilk: fine-grained mineral deposit of calcite, aragonite, formed largely by bacterial deposition.

Output point: a point where water exits from an underground drainage route or aquifer.

Passage: any negotiable part of a cave system, horizontal rather than vertical or sub-vertical sections. Cave passages vary in size and shape, the largest known is Deer Cave, which is up to 170m wide and 120m high, in the Mulu karst of Sarawak.

Percolation water: water moving slowly through the fissure network of a limestone. Usually percolation water enters the limestone through a soil cover. Percolation water accounts for most of the storage in a limestone aquifer, responds slowly to flooding in comparison to sinkhole water.

Permeability: the ability of a rock to transmit water. Permeability may be primary, due to the effects of interlinked porosity or open tectonic fractures, or secondary, due to the dissolutional enlargement of fissures developing conduit permeability.

Phreas: the zone of saturated rock below the water table, within which all conduits are water filled.

Phreatic cave: cave developed below the water table, where all voids are water filled within the phreas. Phreatic caves may include loops deep below the water table, karstic maturity encourages shallow phreatic development just below the water table.

Piezometric surface: the level to which a column of water ascends in an observation well (piezometric tube).

Pit: shaft or pothole from the surface or inside a cave, vertical segment of a gallery.

Pocket valley: a valley that begins abruptly and has no headwaters, having formed from and below the site of a karst spring.

Polje: large flat-floored closed karst depression, with commonly alluviated floor. Streams or springs drain into poljes and outflow is underground through ponors. Commonly the ponors cannot transmit flood flows, so many poljes turn into wet-season lakes. The form of some poljes is related to the geological structure, but others are purely the products of lateral dissolution and planation.

Ponor: also a sinkhole or swallowhole.

Pothole: a single shaft, or an entire cave system that is dominantly vertical.

Pseudokarst: a landscape containing karst-like features but not formed by bedrock dissolution.

Relict cave: inactive cave segment, left when the water is diverted elsewhere.

Salt karst: karst landforms developed upon halite or halite-rich rock.

Shaft: natural vertical, or steeply inclined, section of a cave passage, deepest known shaft is the entrance shaft on the Kanin plateau, Slovenia; it is 643m deep, with no ledges.

Sink: a point where a stream or river disappears underground, through a choke, or may flow into an open horizontal cave or vertical shaft. The character of sink water, flowing directly and rapidly into an open cave, distinguishes it from percolation water. Sink water is also referred to as sub-surface runoff.

Speleology: Scientific study of caves, including aspects of sciences, such as geomorphology, geology, hydrology, chemistry and biology, and also the many techniques of cave exploration.

Speleothem: general term for all cave mineral deposits, embracing all stalactites, flowstone, flowers etc.

Spring: point where underground water emerges on to the surface, not exclusive to limestone, but generally larger in cavernous rocks. Among the world's largest is the Dumanli spring, Turkey, with a mean flow of over 50 cubic metres per second.

Subcutaneous zone: a zone of generally highly weathered rock that lies below the soil but above the main, relatively unweathered, rock mass of a karst aquifer.

Sump: a section of flooded passage, also siphon.

Travertine: calcareous mineral deposited by flowing water, where plants and algae cause the precipitation by extracting carbon dioxide from the water and give travertine its porous structure. Capillary forces, loss of head and aeration also influence travertine deposition.

Troglobite: a creature that lives permanently underground beyond the daylight zone of a cave. Many troglobitic species are adapted in some way to living in a totally dark environment.

Troglophile: an animal that enters beyond the daylight zone of a cave intentionally and habitually and generally spends part of its life in the underground environment.

Trogloxene: a creature that will enter a cave on occasions but does not use the cave either for temporary or permanent habitation.

Vadose cave: a cave that underwent most of its development above the water table within the vadose zone, where drainage is free-flowing under gravity. The gravitational control of vadose flow means that all vadose cave passages drain downslope, they exist in the upper part of a karst aquifer, and they ultimately drain into the phreatic zone or out to the surface.

Vadose zone: the zone of rock above the water table, with free downward drainage, only partially water-filled. Also known as unsaturated zone, and comprises the soil, a subcutaneous or epikarstic zone, and a free-draining percolation zone.

Vauclusian rising: a type of rising or spring where direct drainage from the phreas flows up a flooded cave passage under pressure to emerge in daylight. Such risings are named after the Fontaine de Vaucluse in southern France with a mean flow of 26 cubic metres per second. It is vertical and 243m deep. Discharge fluctuates seasonally.

Water table: the top surface of a body of groundwater that fills the pore spaces within a rock mass. Above it lies the freely draining vadose zone, and below it lies the permanently saturated phreas. Individual cave conduits may be above or below the water table, and therefore either vadose or phreatic, and the water table cannot normally be related to them. The water table slope (hydraulic gradient) is low in limestone due to the high permeability, and the level is controlled by outlet springs or local geological features. High flows create steeper hydraulic gradients and hence rises in the water level away from the spring. In France's Grotte de la Luire, the water level in the cave (and therefore the local water table) fluctuates by 450m.

Water tracing: underground drainage links through unexplored caves confirmed by labelling input water and identifying it at points downstream. The common labelling techniques involve the use of fluorescent dyes (uranine, fluorescein, rhodamine, leucophor, pyranine etc.), lycopodium spores, or chemicals such as common salt. The longest successful water trace was in Turkey over a distance of 130km.

keystone species - species whose loss from an ecosystem would cause a greater than average change in other species populations or ecosystem processes; whose continued well-being is vital for the functioning of a whole community, such as the herring in the North Atlantic or krill in Antarctica.

life-history stage (Criterion 7) - a stage in the development of a finfish or shellfish, e.g., egg, embryo, larva, leptocephalus, zoea, zooplankton stage, juvenile, adult, or post-adult.

migration path (Criterion 8) - the route along which fishes, such as salmon and eels, swim when moving to or from a spawning or feeding ground or nursery. Migration paths often cross international boundaries or boundaries between management zones within a country.

natural (Criterion 1) - when used in Criterion 1, natural (or unmodified) areas are those that still retain a complete or almost complete complement of species native to the area, within a more-or-less naturally functioning ecosystem.

near natural (Criterion 1) - when used in Criterion 1 this means those wetlands which continue to function in what is considered an almost natural way. This clarification is provided in the Criteria to allow for the listing of sites which are not pristine, yet retain values making them internationally important.

nursery (Criterion 8) - that part of a wetland used by fishes for providing shelter, oxygen and food for the early developmental stages of their young. In some fishes, e.g., nest-guarding tilapias, the parent/s remain at the nursery to protect the young whereas in others the young are not protected by the parent/s except by virtue of the shelter provided by the habitat in which they are deposited, e.g., non-guarding catfishes. The ability of wetlands to act as nurseries depends on the extent to which their natural cycles of inundation, tidal exchange, water temperature fluctuation and/or nutrient pulses are retained. Welcomme (1979) showed that 92% of the variation in catch from a wetland-recruited fishery could be explained by the recent flood history of the wetland.

plants (Criteria 3 & 4) – meaning vascular plants, bryophytes, algae and fungi (including lichens).

population (Criterion 6) – in this case meaning the relevant biogeographic population.

population (Criterion 7) - in this case meaning a group of fishes comprising members of the same species.

populations (Criterion 3) - in this case meaning the population of a species within the specified biogeographical region.

provides refuge (Criterion 4) - refer also to definition for "critical stage" which is related. Critical stages are defined as being those activities (breeding, non-breeding, migration stopovers, etc.) which if interrupted or prevented from occurring may threaten long-term conservation of the species. Refuges should be interpreted to mean those locations where such critical stages gain some degree of protection during adverse condition such as drought.

regularly (Criteria 5 & 6) - as in supports regularly - a wetland regularly supports a population of a given size if:

i) the requisite number of birds is known to have occurred in two thirds of the seasons for which adequate data are available, the total number of seasons being not less than three; or

ii) the mean of the maxima of those seasons in which the site is internationally important, taken over at least five years, amounts to the required level (means based on three or four years may be quoted in provisional assessments only).

In establishing long-term 'use' of a site by birds, natural variability in population levels should be considered especially in relation to the ecological needs of the populations present. Thus in some situations (e.g., sites of importance as drought or cold weather refuges or temporary wetlands in semi-arid or arid areas – which may be quite variable in extent between years), the simple arithmetical average number of birds using a site over

several years may not adequately reflect the true ecological importance of the site. In these instances, a site may be of crucial importance at certain times ('ecological bottlenecks'), but hold lesser numbers at other times. In such situations, there is a need for interpretation of data from an appropriate time period in order to ensure that the importance of sites is accurately assessed.

In some instances, however, for species occurring in very remote areas or which are particularly rare, or where there are particular constraints on national capacity to undertake surveys, areas may be considered suitable on the basis of fewer counts. For some countries or sites where there is very little information, single counts can help establish the relative importance of the site for a species.

The International Waterbird Census data collated by Wetlands International is the key reference source.

representative (Criterion 1) - a wetland that is a typical example of a particular wetland type found in a region. Wetland types are defined in Appendix B.

seral stage (Criterion 2) – a phase in the sequential development of a climax community of plant succession.

significant proportion (Criterion 7) - for the fish Criteria - in polar biogeographical regions a "significant proportion" may be 3-8 subspecies, species, families, life-history stages or species interactions; in temperate zones 15-20 subspecies, species, families, etc.; and in tropical areas 40 or more subspecies, species, families, etc., but these figures will vary among regions. A "significant proportion" of species includes all species and is not limited to those of economic interest. Some wetlands with a "significant proportion" of species may be marginal habitats for fish and may only contain a few fish species, even in tropical areas, e.g. the backwaters of mangrove swamps, cave lakes, the highly saline marginal pools of the Dead Sea. The potential of a degraded wetland to support a "significant proportion" of species if it were to be restored also needs to be taken into account. In areas where fish diversity is naturally low, e.g., at high latitudes, in recently glaciated areas or in marginal fish habitats, genetically distinct infraspecific groups of fishes could also be counted.

spawning ground (Criterion 8) - that part of a wetland used by fishes for courting, mating, gamete release, gamete fertilization and/or the release of the fertilized eggs, e.g. herring, shad, flounder, cockles, and many fishes in freshwater wetlands. The spawning ground may be part of a river course, a stream bed, inshore or deep water zone of a lake, floodplain, mangrove, saltmarsh, reed bed, estuary or the shallow edge of the sea. The freshwater outflow from a river may provide suitable spawning conditions on the adjacent marine coast.

species (Criteria 2 & 4) - naturally occurring populations that interbreed, or are capable of interbreeding, in the wild. Under these (and other) Criteria, subspecies are also included.

species interaction (Criterion 7) - exchanges of information or energy between species that are of particular interest or significance, e.g., symbiosis, commensalism, mutual resource defence, communal brooding, cuckoo behaviour, advanced parental care, social hunting, unusual predator-prey relationships, parasitism and hyperparasitism. Species interactions

occur in all ecosystems but are particularly developed in species-rich climax communities, such as coral reefs and ancient lakes, where they are an important component of biological diversity.

supports (Criteria 4, 5, 6 & 7) - provides habitat for; areas which can be shown to be important to a species or an assemblage of species for any period of time are said to support that species. Occupation of an area need not be continuous, but may be dependent on natural phenomena such as flooding or (local) drought conditions.

threatened ecological community (Criterion 2) **-** an ecological community which is likely to become extinct in nature if the circumstances and factors threatening its extent, survival or evolutionary development continue to operate.

Guidelines for a threatened ecological community are that the community is subject to current and continuing threats likely to lead to extinction as demonstrated by one or more of the following phenomena:

i) Marked decrease in geographic distribution. A marked decrease in distribution is considered to be a measurable change whereby the distribution of the ecological community has contracted to less than 10% of its former range, or the total area of the ecological community is less than 10% of its former area, or where less than 10% of the area of the ecological community is in patches of a size sufficiently large for them to be likely to persist for more than 25 years. (The figure of 10% is indicative and for some communities, especially those which originally covered a relatively large area, it may be appropriate to use a different figure).

ii) Marked alteration of community structure. Community structure includes the identity and number of component species that make up an ecological community, the relative and absolute abundance of those species and the number, type and strength of biotic and abiotic processes that operate within the community. A marked alteration of community structure is a measurable change whereby component species abundance, abiotic interactions, or biotic interactions are altered to the extent that rehabilitation of the ecological community is unlikely to occur within 25 years.

iii) Loss or decline of native species that are believed to play a major role in the community. This guideline refers to species that are important structural components of a community or that are important in the processes that sustain or play a major role in the community, e.g., seagrass, termite nests, kelp, dominant tree species.

iv) Restricted geographic distribution (determined at national level) such that the community could be lost rapidly by the action of a threatening process.

v) Community processes being altered to the extent that a marked alteration of community structure will occur. Community processes can be abiotic (e.g., fire, flooding, altered hydrology, salinity, nutrient change) or biotic (e.g., pollinators, seed dispersers, soil disturbance by vertebrates which affect plant germination). This guideline recognizes that ecological processes are important to maintain an

ecological community, e.g., fire regimes, flooding, cyclone damage; and that disruption to those processes can lead to the decline of the ecological community.

turnover (Criteria 5 & 6) – the throughput of waterbirds using a wetland during migration periods such that the cumulative total number using the site is greater than the peak count at any one time.

unique (Criterion 1) - the only one of its type within a specified biogeographic region. Wetland types are defined in Appendix B.

vulnerable (Criterion 2) - as used by the Species Survival Commission of IUCN. A taxon is Vulnerable when it is not either Critically Endangered or Endangered but is facing a high risk of extinction in the wild in the medium-term future, as defined for both animals and plants by the criteria layed out in the *IUCN Red List Categories and Criteria: Version 3.1*. (IUCN 2001). See also 'globally threatened species' above.

waterbirds (Criteria 5 & 6) - The Convention functionally defines waterfowl (a term which, for the purposes of these Criteria and Guidelines, is considered to be synonymous with "waterbirds") as "birds ecologically dependent on wetlands" (Article 1.2). This definition thus includes any wetland bird species. However, at the broad level of taxonomic order, it includes especially:

- penguins: *Sphenisciformes*.
- divers: *Gaviiformes*;
- grebes: *Podicipediformes*;
- wetland related pelicans, cormorants, darters and allies: *Pelecaniformes*;
- herons, bitterns, storks, ibises and spoonbills: *Ciconiiformes*;
- flamingos: *Phoenicopteriformes*:
- screamers, swans, geese and ducks (wildfowl): *Anseriformes*;
- wetland related raptors: *Accipitriformes* and *Falconiformes*;
- wetland related cranes, rails and allies: *Gruiformes*;
- Hoatzin: *Opisthocomiformes*;
- wetland related jacanas, waders (or shorebirds), gulls, skimmers and terns: *Charadriiformes;*
- coucals*: Cuculiformes;* and
- wetland related owls: *Strigiformes*;

wetland benefits (Criterion 7) - the services that wetlands provide to people, e.g., flood control, surface water purification, supplies of potable water, fishes, plants, building materials and water for livestock, outdoor recreation and education. See also Resolution VI.1.

wetland types (Criterion 1) - as defined by the Ramsar Convention classification system, see Appendix B.

wetland values (Criterion 7) - the roles that wetlands play in natural ecosystem functioning, e.g. flood attenuation and control, maintenance of underground and surface water supplies, sediment trapping, erosion control, pollution abatement and provision of habitat.

Appendix H
Additional sources of useful Ramsar guidance

Issue	Guidance
Wise use of wetlands	**Handbook 1:** Wise use of wetlands
Hydrology and hydrological management	**Handbook 8:** An integrated framework for the Convention's water-related guidance.
International co-operation	**Handbook 20:** Guidelines and other support for international co-operation under the Convention
Management planning	**Handbook 18:** Frameworks for managing Ramsar Sites and other wetlands **Wetland Management Planning. A guide for site managers.** Chatterjee, A., Phillips, B. & Stroud, D. (eds.) (2008). WWF, Wetlands International, IUCN & Ramsar Convention. 80 pp. (Available at: http://assets.panda.org/downloads/wetlands_management_guide_2008.pdf)
Wetland inventory	**Handbook 13:** An Integrated Framework for wetland inventory, assessment, and monitoring **Handbook 15:** A Ramsar Framework for wetland inventory and ecological character description.

The Ramsar *Handbooks* referred to are the 4th edition (2010). All Ramsar *Handbooks* are available from www.ramsar.org/handbooks4. This Appendix will be updated once a 5th edition of the Handbooks are issued following COP11.