



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

**Third edition, as adopted by Resolution VII.11 (COP7, 1999) and amended by Resolutions VII.13 (1999), VIII.11 and VIII.33 (COP8, 2002), IX.1 Annexes A and B (COP9, 2005), and X.20 (COP10, 2008)**

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## **I. Introduction**

### **Background**

1. 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”.

2. Assistance with interpreting the key word “*suitable*”, as used in Article 2.1 above, 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.”
3. 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 with their interpretation and application of the Criteria reflecting the development of conservation science.
4. The strategic direction given to the development of the List of Wetlands of International Importance has previously been rather limited. Most notably, the 6th 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” (Operational Objective 6.2).

### Purpose

5. At the time of COP7 in 1999, as the number of designated Ramsar sites was fast approaching 1,000, the Convention on Wetlands first adopted this *Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance* and has amended and added to it since. 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. Guidance is also provided 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.

## II. The vision, objectives and short-term target for the List of Wetlands of International Importance (the Ramsar List)

### The vision of the Ramsar List

6. The Convention on Wetlands has adopted the following vision for the List of Wetlands of International Importance (as amended by Resolution IX.1 Annex B, 2005):

#### 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”).

7. 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.

### **Objectives for the Ramsar List**

8. In order to realise the vision for the Ramsar List described above, the Contracting Parties, the Convention's International Organization Partners, local stakeholders, and the Ramsar Secretariat will work cooperatively towards accomplishing the following four objectives (not necessarily 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.**

9. **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 E). These biogeographical regions are as defined globally, supranationally/ regionally or nationally, and applied by the Contracting Party in a form appropriate to that Party.
10. **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.

#### **Objective 2**

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

11. **2.1)** 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.
12. **2.2)** To include in the Ramsar List wetlands that include 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 or 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).
13. **2.3)** To include in the Ramsar List wetlands critical to the conservation of biological diversity in each biogeographic region.
14. **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.

15. 2.5) To include in the Ramsar List wetlands that are of direct significance for waterbird and fish species or stocks, as well as other taxa, as determined by the relevant Ramsar site selection Criteria (see Section V).

### **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.**

16. 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).
17. 3.2) To undertake other forms of cooperative venture between two or more Contracting Parties that can demonstrate or assist with achieving long-term conservation and sustainable use of Ramsar sites and wetlands in general.
18. 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.**

19. 4.1) To use Ramsar sites as baseline and reference areas for national, supranational/ regional, and international environmental monitoring to detect trends in the loss of biological diversity, climate change, and the processes of desertification.
20. 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 such as 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 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), South 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), etc.

**Short-term target for the Ramsar List to the year 2010**

21. The Convention stresses the importance of wetlands as rich centres of biological diversity and productivity and as life support systems for 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 have set the following short-term target for the Ramsar List.

**Target for the Ramsar List in 2010**

**To ensure that the List of Wetlands of International Importance contains at least 2,500 sites covering 250 million hectares by 2010.**

**III. Wetlands of International Importance and the Ramsar principle of Wise Use**

22. 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).
23. The Strategic Plan adopted at COP6 (1996) equates “wise use” with sustainable use. Contracting Parties to the Convention also recognize that wetlands, through their ecological and hydrological 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. Ramsar COP9 (2005) updated the definition of wise use of wetlands as “the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development”.

Note: Two footnotes were attached to the above definition:

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).

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) under the Convention a wetland as internationally important 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.**

24. 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”. Pursuant to this the Ramsar Convention has developed the concept of “ecological character” for wetlands, which is defined as follows:

***“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”).

25. Contracting Parties are expected to manage their Ramsar sites so as to maintain the ecological character of each site and, in so doing, retain those essential ecological and hydrological functions which ultimately provide its “*benefits/services*”. Ecological character is therefore an indication of the ‘health’ of the wetland and Contracting Parties are expected at the time of designation to describe the site using the approved Ramsar Information Sheet (Appendix A) in sufficient detail to provide a baseline for subsequent monitoring to detect any changes to these ecological and hydrological attributes. Changes to ecological character outside the natural variations may signal that uses of the sites, or externally derived impacts on the sites, 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.
26. 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 been strongly encouraged to include within management plans a regime for regular and rigorous monitoring to detect changes in ecological character (Resolution VII.10).

#### **IV. Guidelines for adopting a systematic approach to identifying priority wetlands for designation under the Ramsar Convention**

27. The Introduction to this Strategic Framework states that its purpose is to provide a clearer understanding, or vision, of the long-term targets or outcomes which the Ramsar Convention is seeking to achieve through the List of Wetlands of International Importance.

28. In the section below, guidance is provided to assist Contracting Parties in 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.
29. When developing and implementing a systematic approach to identifying the priority wetlands for designation as Ramsar sites, Contracting Parties are urged to consider the following issues.
30. **Review national objectives.** As a precursor to developing a systematic approach for identifying future Ramsar sites, Contracting Parties are urged to give careful consideration to the Objectives described in Section II of this Strategic Framework. When considered within the context of the vision and long-term targets for the List of Wetlands of International Importance, these objectives provide a basis for all subsequent considerations in this area.
31. **Wetland definition, types and biogeographic regions.** 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 on the biogeographic regionalisation to be applied. The Ramsar definition of “wetland” is very broad, reflecting the global scale of the Convention, and 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).**

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, assuming they satisfy at least one of the Criteria specified in Section V. The Convention’s classification system for wetland type (see Appendix B) indicates the full range which Contracting Parties are urged to consider in relation to possible listing under the Ramsar Criteria related to representative, rare or unique wetlands (see Section V, Criterion 1).

32. Under Criterion 1, Contracting Parties are expected to identify sites of international importance within an agreed biogeographic regionalisation. The Glossary (Appendix E) 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”.

### **Marine bioregionalization schemes**

33. The major assessment of 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 <http://www.nature.org/tncscience/news/meow.html> 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 and so it can be cross-referenced to many existing regional biogeographic classifications.
34. 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.
35. Since its initial publication, a number of formal corrections to the MEOW ecoregions have been collated, including minor boundary adjustments and changes to nomenclature. It is planned that a formal update to the MEOW system will be issued within one to two years after its initial publication and will include all such adjustments.

### **Terrestrial bioregionalization schemes**

36. 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)**

Intended to provide a satisfactory classification of the world's biotic areas and to provide a framework for conserving species as well as ecologic 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)**

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)**

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.

37. 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.
38. In Europe, a biogeographic regionalisation 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.dataservice.eea.europa.eu/dataservice](http://www.dataservice.eea.europa.eu/dataservice)).
39. 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 use of these schemes as they consider appropriate or to draw to the attention of the 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.
40. Recording precise locational information on the Ramsar Information Sheet 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).
41. 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 (2009). 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.

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42. **Inventories and data.** Contracting Parties are urged to establish the extent and quality of information which has been collected on wetlands within their territory and take steps to complete an inventory if this has not been done. Inventories should be undertaken using accepted models and standards as advocated by the Ramsar Convention (see Resolutions VII.20 and VIII.6). The lack of an inventory should not, however, prevent designations where adequate information is already available for some sites.
43. Consistent with the developing scientific knowledge of the status and distribution of wetlands, their associated plants and animals, and their functions and values, national wetland inventories and/or lists of potential Ramsar sites should be subject to periodic review and updating (Action 1.2.1 of the Ramsar Strategic Plan 2003-2008).
44. **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 sites.
45. **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 animal 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 Section VI for additional guidance for 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.

46. **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.
47. Contracting Parties should also aim to use the Criteria appropriately, meaning that although specific criteria have been developed for waterbirds (Criteria 5 and 6) and for fish (Criteria 7 and 8), these are not the only wetland taxa for which Ramsar sites can and should be listed (see Criterion 9). Waterbirds and fish are simply the ones for which specific guidance has been most fully developed. Criteria 2, 3 and 4 provide latitude to identify sites for any other wetland species, but also for waterbirds and fish, 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.
48. **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.
49. **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.
50. **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 areas 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. 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 nominated.

51. 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.
52. **Flagship and keystone species.** The concepts of indicator, flagship and keystone species are important for Contracting Parties to consider as well. 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.
53. **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.
54. **Non-native species.** The introduction and spread of non-native species is of great concern due to the impact this 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.
55. **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.

56. **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. These may also be a useful management tool for subterranean system wetlands as well as larger sites.
57. 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.
58. 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.

59. 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.
60. **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, or 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 before being 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).
61. 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.
62. **Sites of importance for the interactions between the ecosystem structure and functioning and their benefits.** Wetlands exist within landscapes in which people’s activities are influenced by the wetlands and their delivery of ecosystem benefits/services, and in which the wetlands themselves are influenced by the use of such benefits/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 has 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.
63. **Complementary international frameworks.** When considering Ramsar site designations Contracting Parties are urged, as specified in Objective 4.2 (see paragraph 20), 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 South 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.

## V. Criteria for identifying Wetlands of International Importance, guidelines for their application, and long-term targets

64. In this Section of the Strategic Framework for the Ramsar List, the Criteria for designating sites are presented, along with the long-term target the Convention has agreed for each. For each Criterion, guidelines are also provided to assist Contracting Parties in taking a systematic approach to identifying their priority sites for designation. These guidelines should be considered in conjunction with the more general guidelines given in Section IV. In addition, Appendix E provides a Glossary of the terms used in the Criteria, long-term targets and guidelines presented in the following pages.

### Criteria for the designation of Wetlands of International Importance

<b>Group A of the criteria</b>		<b>Criterion 1:</b> 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.
	Criteria based on species and ecological communities	<b>Criterion 2:</b> A wetland should be considered internationally important if it supports vulnerable, endangered, or critically endangered species or threatened ecological communities.  <b>Criterion 3:</b> 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.

<b>Group B of the criteria</b>		<b>Criterion 4:</b> 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.
Sites of international importance for conserving biodiversity		<b>Criterion 5:</b> A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds.
	Specific criteria based on waterbirds	<b>Criterion 6:</b> 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	<b>Criterion 7:</b> 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.
		<b>Criterion 8:</b> 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	<b>Criterion 9:</b> 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**

**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.

**Long-term target for the Ramsar List:**

65. To have included in the Ramsar List at least one suitable representative of each wetland type, according to the Ramsar classification system (Section IV), which is found within each biogeographic region.

**Guidelines for the application of Criterion 1**

66. In applying this Criterion systematically, Contracting Parties are encouraged to:
- i) determine biogeographic regions within their territory or at the supranational/regional level;
  - 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 provide the best examples.
67. When selecting a biogeographic regionalisation scheme to apply, it is generally most appropriate to use a continental, regional, or supranational scheme rather than a national or subnational one.
68. Objective 1, and in particular 1.2 (paragraph 10 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. In terms of hydrological functioning, the following is provided to assist Contracting Parties consider this aspect of determining priority sites under this Criterion. For guidance relevant to biological and ecological roles refer to Criterion 2.
69. **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 cloudforest or rainforest, wetlands or wetland complexes in semi-arid, arid or desert areas, tundra or peatland systems acting as sinks for carbon, etc.);
  - vii) have a major role in maintaining high water quality standards.

**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.

**Long-term target for the Ramsar List:**

70. To have included in the Ramsar List those wetlands which are believed to be important for the survival of vulnerable, endangered or critically endangered species or threatened ecological communities.

**Guidelines for the application of Criterion 2**

71. Ramsar sites have an important role in the conservation of globally threatened species and ecological communities. Notwithstanding the small numbers of individuals or sites that may be involved, or poor quality of quantitative data or information that may sometimes 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 Criterion 2 or 3.
72. Objective 2.2 within this Strategic Framework urges Contracting Parties to seek to include in the Ramsar List wetlands that include threatened ecological communities or are critical to the survival of species identified as vulnerable, endangered or critically endangered under national endangered species legislation/programmes or within international frameworks such as the IUCN Red Lists or Appendix I of CITES and the Appendices of CMS.
73. 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 providing habitat for rare, vulnerable, endangered, or critically endangered species. Ideally, the sites in the network will have the following characteristics. They:
  - 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) are ecologically linked in other ways, such as through providing refuge areas to populations during adverse conditions; and/or
  - iv) are 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.
74. 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.
75. When selecting a biogeographic regionalisation scheme to apply under paragraph 74 (i) and/or (ii), it is generally most appropriate to use a continental, regional, or supranational scheme rather than a national or subnational one.
76. Note also the issues concerning habitat diversity and succession in paragraphs 56 to 59 above, “Boundary definition of sites”.
77. Be aware also of the biological importance of many karst and other subterranean hydrological systems (see specific guidance below).

**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.**

**Long-term target for the Ramsar List:**

78. To have included in the Ramsar List those wetlands which are believed to be of importance for maintaining the biological diversity within each biogeographic region.

**Guidelines for the application of Criterion 3**

79. 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 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.

80. Be aware also of the biological importance of many karst and other subterranean hydrological systems (see specific guidance below).
81. When selecting a biogeographic regionalisation scheme to apply, it is generally most appropriate to use a continental, regional, or supranational scheme rather than a national or subnational one.

**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.**

**Long-term target for the Ramsar List:**

82. To have included in the Ramsar List those wetlands which are the most important for providing habitat for plant or animal species during critical stages of their life cycle and/or when adverse conditions prevail.

**Guidelines for the application of Criterion 4**

83. 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.
84. 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 listing.

***Specific criteria based on waterbirds***

**Criterion 5:**

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

**Long-term target for the Ramsar List:**

85. To have included in the Ramsar List all wetlands which regularly support 20,000 or more waterbirds.

#### **Guidelines for the application of Criterion 5**

86. 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 53 above, “Species presence in perspective”.)
87. Non-native waterbirds should not be included within the totals for a particular site (refer also to paragraph 54 above, “Non-native species”).
88. 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.
89. 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 paragraphs 60 and 61 above, “Site clusters”. Consideration may also be given to turnover of waterbirds at migration periods, so that a cumulative total is reached, if such data are available.
90. 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.
91. However, 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 at times been applied do not yield statistically reliable or accurate estimates.
92. The only currently available method which is considered to provide reliable estimates of turnover is that of unique capture/mark 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.
93. 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.

**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.**

**Long-term target for the Ramsar List:**

94. To have included in the Ramsar List all wetlands which regularly support 1% or more of a biogeographical population of a waterbird species or subspecies.

**Guidelines for the application of Criterion 6**

95. 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 53 above, “Species presence in perspective”, and paragraph 63 above, “Complementary international 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.
96. To ensure international comparability, wherever possible Contracting Parties should use the international population estimates and 1% thresholds published and updated every three years by Wetlands International as the basis for evaluating sites for the List using this Criterion. As urged by Resolutions VI.4 (1996) and Resolution 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 much of these data.
97. 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.
98. 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 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.
99. 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.

100. 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 under Criterion 5, paragraphs 90-93.

***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.**

**Long-term target for the Ramsar List:**

101. To have included in the Ramsar List those wetlands that support a significant proportion of indigenous fish subspecies, species or families and populations.

**Guidelines for the application of Criterion 7**

102. Fishes are the most abundant vertebrates associated with wetlands. Worldwide, over 18,000 species of fishes are resident for all or part of their life cycles in wetlands.
103. Criterion 7 indicates that a wetland can be designated as internationally important if it has a high diversity of fishes and shellfishes. It emphasises 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. Species counts alone are thus not sufficient to assess the importance of a particular wetland. In addition, the different ecological roles that species may play at different stages in their life cycles needs to be considered.
104. Implicit in this understanding of biological diversity is the importance of high levels of endemism and of biodisparity. Many wetlands are characterised by the highly endemic nature of their fish fauna.
105. 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.
106. 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 catered for in Criterion 2.

107. An important component of biological diversity is biodisparity, i.e., the range of morphologies and reproductive styles in a community. The biodisparity of a wetland community will be determined by the diversity and predictability of its habitats in time and space, i.e., the more heterogeneous and unpredictable the habitats, the greater the biodisparity of the fish fauna. For example, Lake Malawi, a stable, ancient lake, has over 600 fish species of which 92% are maternal mouthbrooding cichlids, but only a few fish families. In contrast, the Okavango Swamp of Botswana, a palustrine floodplain that fluctuates between wet and dry phases, has only 60 fish species but a wider variety of morphologies and reproductive styles, and many fish families, and therefore has a greater biodisparity. Measures of both biological diversity and biodisparity should be used to assess the international importance of a wetland.

**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.**

**Long-term target for the Ramsar List:**

108. To have included in the Ramsar List those wetlands which provide important food sources for fishes, or are spawning grounds, nursery areas and/or on their migration path.

**Guidelines for the application of Criterion 8**

109. 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 openwater adult stages. These wetlands therefore support essential ecological processes for fish stocks, even if they do not necessarily harbour large adult fish populations themselves.
110. 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.
111. This is for guidance only and does not interfere with the rights of Contracting Parties to regulate fisheries within specific wetlands and/or elsewhere.

***Specific criterion 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.**

**Long-term target for the Ramsar List:**

112. To have included in the Ramsar List all wetlands which regularly support 1% or more of a biogeographical population of one non-avian animal species or subspecies.

**Guidelines for the application of Criterion 9**

113. 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 54 above, “Species presence in perspective”, and paragraph 63 above, “Complementary international frameworks”. Consideration may also be given to turnover of individuals of migratory animals at migration periods, so that a cumulative total is reached, if such data are available (guidance in paragraphs 90-93 related to waterbirds is also applicable in relation to non-avian animals).
114. 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 through the IUCN Species Information Service (SIS) and 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 as an adjunct to the RIS Explanatory Note and Guidelines, [http://ramsar.org/ris/key\\_ris\\_criterion9\\_2006.pdf](http://ramsar.org/ris/key_ris_criterion9_2006.pdf).]
115. 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.
116. It is anticipated that this Criterion will be 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 (paragraphs 114-116) 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. For better application of this Criterion, Contracting Parties should assist, where 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.

**VI. Guidelines for identifying and designating specific wetland types**

- A. Guidelines for identifying and designating karst and other subterranean hydrological systems as Wetlands of International Importance (Resolution VII.13)**

117. 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.
118. 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.
119. **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.
120. 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.
121. 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 E) under “Karst”.
122. 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).

123. 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.
  124. 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.
  125. 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.
  126. 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.
  127. 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.
  128. 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.
  129. 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.
- B. Guidance for identifying and designating peatlands, wet grasslands, mangroves and coral reefs as Wetlands of International Importance (Resolution VIII.11)**

## Introduction

130. Action 6.3.1 of the Convention’s Work Plan 2000-2002 requested the Scientific and Technical Review Panel (STRP) to prepare additional guidance for the identification and designation of peatland, wet grassland, mangrove, and coral reef wetland types as Wetlands of International Importance (Ramsar sites).
131. Peatlands, mangroves, and coral reefs were recognized by the Global Review of Wetland Resources and Priorities for Wetland Inventory report to COP7 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.

132. This additional guidance provides clarification of aspects of the application of the *Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance* (Resolution VII.11) as they apply to peatlands, wet grasslands, mangroves, and coral reefs. In particular, it provides guidance to Contracting Parties on the identification and designation of representative wetlands of these habitat types in accordance with Ramsar Criterion 1 for the designation of Wetlands of International Importance.
133. 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 in completing the Information Sheet on Ramsar Wetlands (RIS) for Ramsar site designation, particularly in relation to the delimitation of appropriate boundaries, especially for coral reefs; uncertainty 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.
134. All Ramsar Criteria for the designation of Wetlands of International Importance can be applied to the identification and designation of peatland, wet grassland, mangrove and coral reef wetland types.
135. 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 of particular importance.

### **Identification and designation of peatlands**

136. Peatlands are ecosystems with a peat deposit that may currently support a vegetation that is peat-forming, may not, or may lack vegetation entirely. Peat is dead and partially decomposed plant remains that have accumulated *in situ* under waterlogged conditions. It is understood in this guidance that the term “peatland” is inclusive of active peatland (“mire”). An active peatland (“mire”) is a peatland on which peat is currently forming and accumulating. All active peatlands (“mires”) are peatlands, but peatlands that are no longer accumulating peat would not be considered as active peatlands (“mires”). The presence of peat or vegetation capable of forming peat is the key characteristic of peatlands.
137. Since peatlands are defined by the presence of a peat substrate, whilst the Ramsar Classification System is based on vegetation, peatlands occur in a number of categories in the Ramsar Classification System for Wetland Type:

- a) They may occur as a *Marine/coastal* wetland under categories I (intertidal forested wetlands) and E (sand, shingle or pebble shores, including dune systems), and perhaps marginal areas of K (coastal freshwater lagoons).
  - b) They may occur as an *Inland wetland*, primarily under U (Non-forested peatlands) and Xp (Forested peatlands).
  - c) Peat soils also may be present in all other *Inland wetland* categories except: M (Permanent rivers/streams/creeks), Tp (Permanent freshwater marshes/pools – inorganic soils), Ts (Seasonal/intermittent freshwater marshes/pools – inorganic soils), W (Shrub-dominated wetlands – inorganic soils), Zg (Geothermal wetlands), and Zk(b) (subterranean karst systems).
138. Peatlands contribute to biological diversity, global water issues, global carbon retention relevant to climate change, and wetland functions valuable to human communities.
139. Significant features of peatlands include:
- a) uniqueness of the peat-forming phenomenon and its ecological and natural resource functions;
  - b) dependence of peatlands on their hydrology and hydrochemistry;
  - c) interdependence between peatlands and their catchments and adjacent watersheds;
  - d) uniqueness of their vegetation;
  - e) provision of habitat for particular taxa of fauna and flora;
  - f) water regulation and buffering functions;
  - g) capacity to regulate local and regional climates;
  - h) capacity to sequester carbon from the atmosphere and store it for long periods of time; and
  - i) ability to serve as geochemical and palaeo archives.
140. In addition to their many natural values, peatlands have important socio-economic values which include, but are not limited to, the absorption and release of drinking water, natural resource provision to local communities and indigenous people, landscape stabilization, flood mitigation, removal of pollutants, tourism, and recreation.
141. Threats to peatlands can arise from both within and outside their area and include:
- a) direct threats, including drainage and land conversion, excavation, burning, overgrazing, agricultural abandonment, visitor pressure, non-sustainable commercial exploitation; and
  - b) indirect threats, including pollution, excessive water abstraction, reduction in extent and quality of buffer zones, and climate change.
142. Some peatlands that have been modified but remain ecologically valuable are subject to similar threats. Opportunities exist for the restoration of such areas.

### Applying the Ramsar Criteria to peatlands

143. Peatlands considered for designation under Criterion 1 should include pristine active peatlands, mature peatlands and peatlands that may be no longer forming peat, naturally degrading peatlands, human-modified and impacted peatlands, and restored or rehabilitated peatlands.
144. Special attention should be given to the designation of peatlands which have at least some of the following attributes:
  - a) an intact hydrology;
  - b) the presence of a peat-forming vegetation;
  - c) the capacity to act as a reservoir of regional/global biodiversity;
  - d) the capacity to act as a carbon store;
  - e) the presence of a carbon sequestration function;
  - f) the ability to maintain a geochemical and/or palaeo archive;
  - g) hydrochemical diversity; and
  - h) macro- and/or micro-morphological features.
145. Special attention should also be given to the designation of peatlands that have high vulnerability, such that minor impacts can lead to major degradation, and to those with potential for restoration after degradation.
146. Large areas of peatland are normally of higher importance than small areas for their hydrological, carbon storage and palaeoarchive values and because they incorporate macro-landscapes: these should be afforded high priority for designation. Consideration should also be given to the capacity of the peatland system to influence regional climate.
147. Where appropriate and desirable, peatlands designated as Ramsar sites should include entire catchments, so as to maintain the hydrological integrity of the peatland system.
148. Designation of both single peatlands and complex systems that incorporate more than one type of peatland system is appropriate.

#### **Identification and designation of wet grasslands**

149. Wet grasslands 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.
150. 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.
151. 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.

152. Wet grasslands are covered by the following wetland types of the Ramsar Classification System:
  - a) They can occur as a *floodplain component*, under T (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).
153. 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.
154. In recent years there has been increasing awareness about 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.
155. 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.

156. 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.

### **Applying the Ramsar Criteria to wet grasslands**

157. A wet grassland should be considered for designation under Criterion 1 particularly if it performs specific hydrological functions.
158. 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.
159. 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.

160. 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.

### **Identification and designation of mangroves**

161. Mangroves swamps are forested intertidal ecosystems that occupy sediment-rich sheltered tropical coastal environments, occurring from about 32° N (Bermuda Island) to almost 39° S (Victoria, Australia). Around two-thirds to three-quarters of tropical coastlines are mangrove-lined.
162. 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.
163. 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.
164. Mangroves occur under *Marine/Coastal Wetlands: I (Intertidal forested wetlands)* in the Ramsar Classification System for Wetland Type.
165. 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.
166. 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.
167. 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.

168. 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.
169. 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.
170. 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.
171. 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.
172. 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.

### **Applying the Ramsar Criteria to mangroves**

173. 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.
174. 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.

175. 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.
176. 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.
177. 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.
178. 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.
179. 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.
180. 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.

### **Identification and designation of coral reefs**

181. 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<sup>2</sup>, forming about 15% of the marine shallow shelves.
182. 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.
183. 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.
184. Coral reefs falls under *Marine/Coastal Wetlands: C (Coral reefs)* in the Ramsar Classification System for Wetland Type.
185. 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).
186. 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.
187. Corals also provide a vital source of life-saving medicines, including anticoagulants and anticancer agents such as prostaglandins.
188. 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.

189. 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.
190. 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.
191. 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 may reduce the rate of calcification and reef formation.
192. 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.
193. 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.
194. 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.
195. 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.

196. 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.

#### **Applying the Ramsar Criteria to coral reefs**

197. 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.
198. 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.
199. 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”.
200. Reefs that buffer coastlines against storm damage, and so protect coastal populations and infrastructure, should also be considered for designation.
201. 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.
202. 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.
203. 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 182 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 182 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.

204. 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.
205. 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.
206. 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.
207. 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.

**C. Guidance for identifying, sustainably managing, and designating temporary pools as Wetlands of International Importance (Resolution VIII.33)**

**Introduction**

208. Resolution 5.6 adopted *Additional guidance for the implementation of the wise use concept*, stressing that at local level “in order to achieve wise use of wetlands, it is necessary to attain a balance that ensures the maintenance of all wetland types through activities that can range from strict protection all the way to active intervention, including restoration. Wise use activities therefore can be varied in nature, ranging from very little or no resource exploitation, to active resource exploitation as long as it is sustainable. . . . Wetland management should be adapted to specific local circumstances, sensitive to local cultures and respectful of traditional uses.”

209. Recommendation 5.3 called for the establishment of strict protection measures for Ramsar sites and wetland reserves of small size or particular sensitivity. This call was reiterated in Action 5.2.5 of the Convention's Strategic Plan 1997-2002, adopted by Resolution VI.14 (1996), which indicates that Contracting Parties should promote the establishment and implementation of protection measures for such wetlands. Furthermore, it is important to note that approaches called for in Recommendation 5.3 are not the only tools available to promote wetland conservation and that this is also effective when it happens as a result of voluntary actions by informed citizens.
210. Guidance concerning the designation of small wetlands as Wetlands of International Importance is included in the *Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance*, adopted by COP7: "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" (paragraph 49 above).
211. Furthermore, Operational Objective 6.2 of the 1997-2002 Strategic Plan is "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 global or national level". The Convention's Strategic Plan 2003-2008 (Resolution VIII.25) reiterates that designation of wetland types under-represented in the List requires priority attention, with priority wetland types identified as including arid zone wetlands – regions of major occurrence and importance for temporary pools.
212. However, out of the 1590 wetland sites on the Ramsar List (as of February 2006), only 70 have been specifically designated as including temporary pools (wetland types Ss and Ts), and only five have temporary pools as the dominant wetland type.
213. This additional guidance provides information to support Contracting Parties in their application of the Convention's wise use concept so as to secure the sustainable use of temporary pools, and to assist in their application of the *Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance* for the identification and designation of temporary pools as Ramsar sites. The guidance has been prepared in recognition of the fact that 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.

### **Identification of temporary pools**

214. 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.

- 215. 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.
- 216. 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.
- 217. 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.
- 218. 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)).
- 219. 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 *Caltriche* 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.

### **Sustainably managing temporary pools**

220. There are a number of threats to the sustainable maintenance of temporary pools, the most important of which include:
- a) alteration of the delicate hydrological functioning upon which they depend, including drainage for land conversion and conversely their transformation into more permanent pools, which leads to encroachment by less specialized, more competitive plant and animal species and which may threaten the key biodiversity values of temporary pools through increases in predators or competitors;
  - b) the vulnerability of temporary pools and their biological diversity to increasing and persistent drought in arid and semi-arid regions;
  - c) unsustainable exploitation of the natural resources of temporary pools, such as over-grazing, excessive harvesting of vegetation for fodder, and over-abstraction of water;
  - d) solid waste dumping;
  - e) indirect threats including pollution, excessive water abstraction or diversion in the catchment, and natural changes through filling in from sedimentation and shrub encroachment;
  - f) abandonment of traditional life styles and land uses leading to neglect of the temporary ponds and loss of recognition of their values and functions; and
  - g) lack of recognition of their values and functions.
221. To secure the sustainable management of temporary pools, the following approaches should be applied:
- a) ensuring that temporary pools are included as a wetland type in national wetland inventories;
  - b) ensuring that the specific hydrological functioning upon which temporary pools depend, including their independence from permanent surface waters, is maintained;

- c) ensuring that natural resources provided by temporary pools, such as water and fodder, are not over-exploited;
- d) undertaking a regular surveillance of known temporary pools so as to avert any potential direct or indirect threats which may appear;
- e) taking care that the impact of the creation of a new pool is assessed prior to its creation so as to ensure that the broader ecosystem surrounding it will not be negatively affected; and
- f) raising awareness of the existence of temporary pools and their specific values and functions as wetland ecosystems.

#### **Designation of temporary pools as Ramsar sites: the application of the Ramsar Criteria**

- 222. 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.
- 223. 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.
- 224. 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.
- 225. 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.
- 226. 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.

227. Where possible, temporary pools designated as Ramsar sites should include their entire (usually small) catchments, so as to maintain their hydrological integrity.
228. 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.

#### **D. Guidance for identifying and designating artificial wetlands**

229. 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.”
230. Many existing Ramsar sites are artificial (in whole or in part) in as much 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.
231. 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.

## Appendix A

# Information Sheet on Ramsar Wetlands (RIS) – 2009-2012 version

Available for download from [http://www.ramsar.org/ris/key\\_ris\\_index.htm](http://www.ramsar.org/ris/key_ris_index.htm).

*Categories approved by Recommendation 4.7 (1990), as amended by Resolution VIII.13 of the 8<sup>th</sup> Conference of the Contracting Parties (2002) and Resolutions IX.1 Annex B, IX.6, IX.21 and IX. 22 of the 9<sup>th</sup> Conference of the Contracting Parties (2005).*

### Notes for compilers:

1. The RIS should be completed in accordance with the attached *Explanatory Notes and Guidelines for completing the Information Sheet on Ramsar Wetlands*. Compilers are strongly advised to read this guidance before filling in the RIS.
2. Further information and guidance in support of Ramsar site designations are provided in the *Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance* (Ramsar Wise Use Handbook 14, 3<sup>rd</sup> edition).
3. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers should provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of all maps.

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**1. Name and address of the compiler of this form:**

FOR OFFICE USE ONLY.

**2. Date this sheet was completed/updated:**

DD	MM	YY

Designation date

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Site Reference Number

**3. Country:**

**4. Name of the Ramsar site:**

The precise name of the designated site in one of the three official languages (English, French or Spanish) of the Convention. Alternative names, including in local language(s), should be given in parentheses after the precise name.

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**5. Designation of new Ramsar site or update of existing site:**

This RIS is for (tick one box only):

- a) Designation of a new Ramsar site ; or  
b) Updated information on an existing Ramsar site

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**6. For RIS updates only, changes to the site since its designation or earlier update:**

a) Site boundary and area

The Ramsar site boundary and site area are unchanged:

or

If the site boundary has changed:

- i) the boundary has been delineated more accurately ; or  
ii) the boundary has been extended ; or  
iii) the boundary has been restricted\*\*

and/or

**If the site area has changed:**

- i) the area has been measured more accurately ; or
- ii) the area has been extended ; or
- iii) the area has been reduced\*\*

**\*\* Important note:** If the boundary and/or area of the designated site is being restricted/reduced, the Contracting Party should have followed the procedures established by the Conference of the Parties in the Annex to COP9 Resolution IX.6 and provided a report in line with paragraph 28 of that Annex, prior to the submission of an updated RIS.

**b) Describe briefly any major changes to the ecological character of the Ramsar site, including in the application of the Criteria, since the previous RIS for the site:**

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**7. Map of site:**

Refer to Annex III of the *Explanatory Note and Guidelines*, for detailed guidance on provision of suitable maps, including digital maps.

**a) A map of the site, with clearly delineated boundaries, is included as:**

- i) a hard copy (required for inclusion of site in the Ramsar List) ;
- ii) an electronic format (e.g. a JPEG or ArcView image) ;
- iii) a GIS file providing geo-referenced site boundary vectors and attribute tables .

**b) Describe briefly the type of boundary delineation applied:**

e.g. the boundary is the same as an existing protected area (nature reserve, national park, etc.), or follows a catchment boundary, or follows a geopolitical boundary such as a local government jurisdiction, follows physical boundaries such as roads, follows the shoreline of a waterbody, etc.

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**8. Geographical coordinates (latitude/longitude, in degrees and minutes):**

Provide the coordinates of the approximate centre of the site and/or the limits of the site. If the site is composed of more than one separate area, provide coordinates for each of these areas.

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**9. General location:**

Include in which part of the country and which large administrative region(s) the site lies and the location of the nearest large town.

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**10. Elevation:** (in metres: average and/or maximum & minimum)

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**11. Area:** (in hectares)

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**12. General overview of the site:**

Provide a short paragraph giving a summary description of the principal ecological characteristics and importance of the wetland.

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**13. Ramsar Criteria:**

Tick the box under each Criterion applied to the designation of the Ramsar site. See Annex II of the *Explanatory Notes and Guidelines* for the Criteria and guidelines for their application (adopted by Resolution VII.11). All Criteria which apply should be ticked.

1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9

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**14. Justification for the application of each Criterion listed in 13 above:**

Provide justification for each Criterion in turn, clearly identifying to which Criterion the justification applies (see Annex II for guidance on acceptable forms of justification).

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**15. Biogeography** (required when Criteria 1 and/or 3 and /or certain applications of Criterion 2 are applied to the designation):

Name the relevant biogeographic region that includes the Ramsar site, and identify the biogeographic regionalisation system that has been applied.

a) biogeographic region:

b) biogeographic regionalisation scheme (include reference citation):

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**16. Physical features of the site:**

Describe, as appropriate, the geology, geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth, water permanence; fluctuations in water level; tidal variations; downstream area; general climate, etc.

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**17. Physical features of the catchment area:**

Describe the surface area, general geology and geomorphological features, general soil types, and climate (including climate type).

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**18. Hydrological values:**

Describe the functions and values of the wetland in groundwater recharge, flood control, sediment trapping, shoreline stabilization, etc.

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**19. Wetland Types**

**a) presence:**

Circle or underline the applicable codes for the wetland types of the Ramsar "Classification System for Wetland Type" present in the Ramsar site. Descriptions of each wetland type code are provided in Annex I of the *Explanatory Notes & Guidelines*.

Marine/coastal: A • B • C • D • E • F • G • H • I • J • K • Zk(a)

Inland: L • M • N • O • P • Q • R • Sp • Ss • Tp • Ts • U • Va •  
Vt • W • Xf • Xp • Y • Zg • Zk(b)

Human-made: 1 • 2 • 3 • 4 • 5 • 6 • 7 • 8 • 9 • Zk(c)

**b) dominance:**

List the wetland types identified in a) above in order of their dominance (by area) in the Ramsar site, starting with the wetland type with the largest area.

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**20. General ecological features:**

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site, and the ecosystem services of the site and the benefits derived from them.

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**21. Noteworthy flora:**

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 14, Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

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**22. Noteworthy fauna:**

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 14, Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc., including count data. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

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**23. Social and cultural values:**

- a) Describe if the site has any general social and/or cultural values e.g., fisheries production, forestry, religious importance, archaeological sites, social relations with the wetland, etc. Distinguish between historical/archaeological/religious significance and current socio-economic values;
- b) Is the site 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 Yes, tick the box  and describe this importance under one or more of the following categories:

- i) sites which provide a model of wetland wise use, demonstrating the application of traditional knowledge and methods of management and use that maintain the ecological character of the wetland;
- ii) sites which have exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland;
- iii) sites where the ecological character of the wetland depends on the interaction with local communities or indigenous peoples;
- iv) sites where relevant non-material values such as sacred sites are present and their existence is strongly linked with the maintenance of the ecological character of the wetland;

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**24. Land tenure/ownership:**

- a) within the Ramsar site:
- b) in the surrounding area:

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**25. Current land (including water) use:**

- a) within the Ramsar site:
- b) in the surroundings/catchment:

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**26. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land (including water) use and development projects:**

- a) within the Ramsar site:

b) in the surrounding area:

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**27. Conservation measures taken:**

a) List national and/or international category and legal status of protected areas, including boundary relationships with the Ramsar site:

In particular, if the site is partly or wholly a World Heritage Site and/or a UNESCO Biosphere Reserve, please give the names of the site under these designations.

b) If appropriate, list the IUCN (1994) protected areas category/ies which apply to the site (tick the box or boxes as appropriate):

Ia ; Ib ; II ; III ; IV ; V ; VI

c) Does an officially approved management plan exist; and is it being implemented?:

d) Describe any other current management practices:

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**28. Conservation measures proposed but not yet implemented:**

e.g. management plan in preparation; official proposal as a legally protected area, etc.

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**29. Current scientific research and facilities:**

e.g., details of current research projects, including biodiversity monitoring; existence of a field research station, etc.

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**30. Current communications, education and public awareness (CEPA) activities related to or benefiting the site:**

e.g. visitors' centre, observation hides and nature trails, information booklets, facilities for school visits, etc.

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**31. Current recreation and tourism:**

State if the wetland is used for recreation/tourism; indicate type(s) and their frequency/intensity.

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**32. Jurisdiction:**

Include territorial, e.g. state/region, and functional/sectoral, e.g. Dept of Agriculture/Dept. of Environment, etc.

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**33. Management authority:**

Provide the name and address of the local office(s) of the agency(ies) or organisation(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.

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**34. Bibliographical references:**

Scientific/technical references only. If biogeographic regionalisation scheme applied (see 15 above), list full reference citation for the scheme.

## **Explanatory Note and Guidelines for completing the *Information Sheet on Ramsar Wetlands (RIS)***

### **Background and context**

Recommendation 4.7 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*”.

Resolution 5.3 reaffirmed that a completed “Ramsar datasheet” and site map should be provided upon designation of a Wetland of International Importance (hereafter referred to as 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.

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.

*Criteria for Identifying Wetlands of International Importance* were first adopted 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. The Criteria were again substantively revised and, together with detailed guidance for their application, adopted by Resolution VII.11 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) Resolution IX.1 Annex B. These Criteria and guidelines are included as Annex II of this Explanatory Note.

The *Information Sheet on Ramsar Wetlands (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 designated Ramsar sites can and 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 has urged Contracting Parties to revise the data provided in the RIS at least every six years.

The RISs and their accompanying maps are held by the Ramsar Secretariat. The information provided by Contracting Parties in the RIS is used as the basis for entering data and information into the Ramsar Sites Database, managed on behalf of the Convention by Wetlands International under contract from the Ramsar Secretariat. 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 (Resolution VII.11) and other Resolutions of the Conferences of the Parties.

The information provided by Contracting Parties in the RIS, including any supplementary information provided, and held in the Ramsar Sites Database is also made publicly available through the Ramsar Site Information Service Website (<http://www.wetlands.org>).

## General guidance

The RIS must be completed in one of the Convention's three working languages, namely English, French, or Spanish. The RIS and this accompanying *Explanatory Note and Guidelines* are available in each of the three working languages.

The information provided in the RIS should be clear and succinct, and the total length of a completed RIS should not normally exceed 12 pages.

In the case of a wetland which 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, should be appended to the RIS and are treated as part of the official record of the site. Photographs (prints, transparencies or electronic images) of the wetland are also especially welcome. It is essential that the source providing any such additional information be noted.

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.

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 which should 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).

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.

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.

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 that emphasis should be given to:

- establishing a baseline by describing the functions, products and attributes of the site that give it benefits and values of international importance (necessary because the existing Ramsar Criteria do not cover the full range of wetland benefits and values which should be considered when assessing the possible impact of changes at a site) -- sections 14, 16, 18, 19, 20, 21, 22 and 23 of the RIS apply;
- providing information on human-induced factors that have affected or could significantly affect the benefits and values of international importance -- section 26 of the RIS applies;
- providing information on monitoring and survey methods in place (or planned) at the site – sections 27 and 28 of the RIS apply; and
- providing information on the natural variability and amplitude of seasonal and/or long-term “natural” changes (e.g., vegetation succession, episodic/catastrophic ecological events such as hurricanes) that have affected or could affect the ecological character of the site -- sections 18 and 26 of the RIS apply.

### **Guidance on information to provide in each numbered section of the *Information Sheet on Ramsar Wetlands (RIS)***

1. **Name and address of the RIS compiler:** The full name, institution/agency, and address of the person(s) who compiled the RIS, together with any telephone and fax numbers and e-mail address.
2. **Date:** The date on which the RIS was completed (or updated). Please use the *name* of the month, not its numerical equivalent. For example use 6 March [year] or March 6 [year] rather than 6/3/year or 3/6/year so as to avoid confusion arising from commonly used but differing formats for expressing dates.
3. **Country:** The official (short) version of the Contracting Party/country name.
4. **Name of the Ramsar site:** The precise name of the designated site in one of the three official languages (English, French or Spanish) of the Convention. Alternative names, including in local language(s), should be given in parenthesis after the precise name. Ensure that the site name used is the same in this section and on the maps provided. **This name will be used precisely as given when the site is added to the Ramsar List.**
5. **Designation of new Ramsar site or update of existing site:** Indicate here if the RIS is being provided for the designation of a new Ramsar site or if it is provided as an update for an already designated Ramsar site. If the RIS is an update for an existing site, please also complete section 6 of the RIS (see below).
6. **For RIS updates only, changes to the site since its designation or earlier update:** In part a) of this section, indicate if there have or have not been any changes to the boundary delimitation and/or the area of the site since the previous RIS or other site information

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 being made. The Convention text makes provision for the designation of new sites and the extension of existing sites, but not for the reduction in area or deletion from the List of sites already designated. The Annex to COP9 Resolution IX.6, *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. If the boundary and/or the area of the designated site is being restricted/reduced, the Contracting Party should have followed the procedures established in the Annex to COP9 Resolution IX.6 and provided a report in line with paragraph 28 of that Annex, in addition to the provision of an updated RIS.

In part b) of this section, please provide a short summary description of any major changes to the ecological character of the Ramsar site, including in the application of the Criteria, since the previous RIS or information was supplied for the site.

7. **Map of the Ramsar Site:** The most up-to-date available and suitable map of the wetland should be appended to the RIS (in hardcopy and, if possible, also in digital format). At least a hardcopy map is required for the inclusion of the site in the List of Wetlands of International Importance. The map must clearly show the boundary of the designated Ramsar site. Annex III provides detailed guidance on the provision of suitable Ramsar site maps and other spatial data. 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. If the map has been prepared in digital (GIS) format, please send a GIS file providing geo-referenced site boundary vectors and attribute tables, and please **also** send a separate image file, showing the site boundaries, in a common image format (TIFF, BMP, JPG, GIF, etc.).
8. **Geographical coordinates:** The geographical coordinates of the *approximate* centre of the site expressed in *degrees and minutes of latitude and longitude* (e.g. in the format: 01°24'S 104°16'E or 01°30'N 084°51'W). If relevant, specify the number of discrete units forming the site. If any disjunct units are situated at least 1.6 km\* apart, 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 labelled on the site map(s). A single site occupying less than 1,000 hectares needs only one central set of coordinates. Location information on larger areas should be supplemented by providing the coordinates of the southwest and northeast corners of the Ramsar site. (See also sections 7, Map and 11, Area).

\*This is approximately equivalent to one (1) minute of latitude or longitude (at the equator, in the case of longitude).

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.

9. **General Location:** A description of the general location of the wetland. This should include 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 the site's distance (as either a straight line distance or distance by road) and

compass bearing from the nearest “provincial”, “district” or other significant administrative centre, town, or city. The human population of the listed centre and its administrative regions (if possible, including at least two levels of administration/jurisdiction) should also be stated.

10. **Elevation:** The average and/or minimum and maximum elevation of the wetland in metres above mean sea level, in metres. Clearly label each elevation provided, with e.g. “average”, “maximum” or “minimum”).
11. **Area:** The total area of the designated site, in hectares. If the areas of discrete site units are known, please also list each of these together with the names (or labels) used to identify and differentiate these units (see also section 7, Map).
12. **General overview of the site:** A brief paragraph about the wetland, providing a ‘word picture’ of the type of wetland and its importance, its main physical and ecological character features, its most important values and functions, and any particularly interesting features. Note also the most significant wetland types, especially if they are the most dominant as identified in 19 b).
13. **Ramsar Criteria:** Tick the box under the code for each *Ramsar Criterion for identifying wetlands of international importance* that is being applied to the designation of the site. Refer to Annex II of these guidelines for the Criteria and the detailed guidance provided for their application established by Resolution VII.11 (as updated and amended by Resolution IX.1 Annex B), *Strategic Framework and Guidelines for the future development of the List of Wetlands of International Importance*.

Note that many sites qualify for 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 section 14 on justification of Criteria selected under this section.

14. **Justification for the application of each Criterion listed in 13 above:** For each Criterion selected under the section above listing the Ramsar Criteria applied, a specific individual explanation of how that Criterion applies to the site. This section of the RIS is central to the concept of “international importance”. The Criteria codes alone do not convey information on the specific way in which each Criterion applies to a particular site – therefore it is essential to provide sufficient precise description to explain and support each of the Ramsar Criteria codes selected. This text must not just restate the Criterion, but should provide the necessary details to describe the way in which a particular Criterion applies specifically at the site being designated. Refer to Annex II for the detailed guidance for the application of the Criteria (adopted by Resolution VII.11 and as amended by Resolution IX.1 Annex B).

A number of points concerning the correct use of specific Criteria and the Guidelines for their application should be particularly taken into account when preparing the justification for the application of the Criteria selected for designation:

- i) The guidelines for the application of **Criteria 1 and 3** stress that these Criteria should be applied to a wetland in the context of the biogeographic region within which it occurs, but recognises that biogeographic regions can differ between

wetland types. 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 regionalisation scheme applied should be provided in section 15, Biogeography;

- ii) Concerning **Criterion 5** the guidelines indicate that the actual total number of waterbirds should be stated, 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;
- iii) For justification of designation under **Criterion 6** it is particularly important to recognise that this Criterion must be applied to the regular occurrence of >1% of a biogeographic population of a species or subspecies of waterbird, and to recognise that in most cases the biogeographic range of waterbird populations is larger than the territory of one Contracting Party. 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. Recommended 1% thresholds for the application of Criterion 6 are provided by Wetlands International's publication *Waterbird Population Estimates* 4<sup>th</sup> Edition (2006) (available from mid-2006 at <http://www.wetlands.org/>), 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. 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* 3<sup>rd</sup> Edition, the guidelines indicate that this Criterion may be applied if a reliable population estimate and 1% threshold is available from another source, and that in such cases the information source must be 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.
- iv) For all or some applications of **Criteria 2, 3, 4, 5, 6, 7, 8 and 9**, the name(s) of the species concerned (scientific name and vernacular name in English, French or Spanish) should be provided in the justification.
- v) The Guidelines for the application of **Criterion 7** concerning fish and shellfish diversity indicate that a species list alone is not sufficient justification for the use of this Criterion, and that other features of high diversity, including life-history stages, species interactions, and level of endemism are required for the application of this Criterion.
- vi) The guidance for the application of **Criterion 9** for non-avian animal species is similar to that in sub-paragraph iii) 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 recognised that in many cases the biogeographic range of the population is larger than the territory of one Contracting Party. 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 are provided in the paper “*Population estimates and 1% thresholds for wetland-dependent non-avian species, for the application of Criterion 9*” ([http://ramsar.org/ris/key\\_ris\\_criterion9\\_2006.pdf](http://ramsar.org/ris/key_ris_criterion9_2006.pdf)), which also provides a description of the biogeographic range of each population. 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 that paper, the guidelines indicate that this Criterion may be applied if a reliable population estimate and 1% threshold is available from another source, and that in such cases the information source must 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.

- 15. Biogeography:** The *biogeographic region* encompassing the Ramsar site and the *biogeographic regionalisation scheme* applied (with full reference citation) should be provided. Biogeographical specification is essential for the correct application of Criteria 1 and 3 and certain applications of Criterion 2 (see also sections 13. Ramsar Criteria and 14. Justification of Criteria). In this context the guidelines for the application of the Ramsar Criteria (see Annex II) 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. It is also recognised that the nature of biogeographic regionalization may differ between wetland types according to the nature of the parameters determining natural variation (see Annex II of this *Explanatory Note and Guidelines*).

There are a variety of different global and supranational/regional biogeographic schemes in use. No single scheme may be universally appropriate or acceptable and Contracting Parties are urged (in the annex to Resolution VII.11) to apply a regionalization scheme which they determine to be the most appropriate and scientifically rigorous approach available, taking into account that the additional guidance adopted by Resolution IX.1 Annex B indicates that it is generally most appropriate to use a continental, regional or supranational scheme rather than a national or subnational one.

- 16. Physical features of the site:** A succinct description of the principal physical characteristics of the site covering the following features (where relevant):

- Geology and geomorphology (general features);
- Soil type and chemistry range (Soil family name(s); indication of mineral vs. organic content; typical pH range of soil);
- Sediment characteristics;
- Origins (natural or artificial);
- Hydrology (including seasonal water balance, inflow, infiltration and outflow, salt-water intrusion). Further detail, notably the hydrological values and functions of the site should be included in section 18, Hydrological values;
- Water quality (typical physico-chemical characteristics);
- Depth, fluctuations and permanence of water;

- Tidal range and variations;
- Downstream area (especially in the case of wetlands that are important in flood control);
- Climate – include here only the most significant regular climatic features, e.g., annual rainfall and average temperature range, distinct seasons, typical flooding and drought periods, and any other normal climatic factors affecting the wetland. Recent major or extreme climate events, e.g., flood, drought, hurricane, cyclone or other storm, atypical period of extreme temperatures, etc., that have had an adverse impact on the site should be detailed under section 26, Factors adversely affecting the site's ecological character).

17. **Physical features of the catchment area:** A succinct characterisation of the catchment area, covering:

- surface area;
- general geology and geomorphological features;
- general soil types;
- climate (including characterisation of climate type).

18. **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. Hydrology of the site (as opposed to its hydrological values and functions) should be covered under section 16, Physical features of the site.

19. **Wetland Type(s):** In this section first list, by circling or underlining, the full range of wetland types occurring within the site, and then list the wetland types selected in order of their dominance (by area) starting with the wetland type with the largest area. The Ramsar Classification System for Wetland Type (see Annex I of this *Explanatory Note and Guidelines*) 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.

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.

When listing the areal dominance of the wetland types, if possible provide the area or percentage of the total area of the designated site composed of each wetland type, although it is recognised that this may be difficult for large sites with a wide variety of wetland types. If the site is composed of more than one discrete unit and different wetland types or different dominance of types occur in different site units, also list the wetland type dominance for each unit (see also the guidance on sections 7, Map; 8, Geographical coordinates; and 9, Area).

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 also list the area, or percentage of the total area, of the site formed of these habitats.

20. **General ecological features:** A description of the wetland ecosystem with its main habitats, wetland and vegetation types, describing any zonation, seasonal variations, and long-term changes. Briefly describe ecological processes which maintain the wetland and the ecosystem services that characterise the wetland and the benefits derived from these services. A brief note on habitats and vegetation types in adjacent areas may be appropriate. Where important, information on specific food chains should be included in this section.
21. **Noteworthy flora:** Additional/supplemental information on plant species or communities for which the wetland is particularly important or significant should be provided here. **Do not duplicate** information that has already been provided in support of the site's international importance (in section 14, Justification of Criteria) or in section 20, General ecological features. Specify *why* each species or community listed is considered noteworthy (e.g., if it is an economically important species).

Endemic plant species, if they 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) can be listed here.

Also list here plant species that have been introduced (accidentally or intentionally) and/or those that are invasive. (Description of the impacts by invasive and/or alien species on the site should be provided in section 26, Factors adversely affecting the site's ecological character).

General species (occurrence) lists should not be included here or under other RIS sections, but such lists (properly labelled with site details) should be appended to the RIS when they are available.

22. **Noteworthy fauna:** Additional/supplemental information on animal species or communities for which the wetland is particularly important or significant should be provided here. **Do not duplicate** information that has already been provided in support of the site's international importance (in section 14, Justification of Criteria) or in section 20, General ecological features. Specify *why* each species or community 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).

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 this section. Noteworthy zoogeographical features (relict populations, unusual range extensions, etc.) should be noted here.

Also list here animal species that have been introduced (accidentally or intentionally) and/or those that are invasive. (Description of the impacts by invasive and/or alien species on the site should be provided in section 26, Factors adversely affecting the site's ecological character).

General species (occurrence) lists should not be included here or under other RIS sections, but such lists (properly labelled with site details) should be appended to the RIS when they are available.

23. **Social and cultural values:** in section a) provide a general account of the site's principal social and economic values and functions and "wise use" features presented in Ramsar Handbooks 1 to 6 (e.g., tourism, outdoor recreation, education and scientific research, agricultural production, grazing, water supply, fisheries production) and cultural values and functions (e.g., archaeological sites, historical associations and/or religious significance, including its significance to indigenous peoples). For more information, see the *Guiding principles for taking into account the cultural values of wetlands for the effective management of sites*, annexed to Resolution VIII.19. Whenever possible, indicate which of these values are consistent with the maintenance of natural wetland processes and ecological character. In section b) indicate 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. Details about values derived from non-sustainable exploitation or which result in detrimental ecological changes should be described in section 26, Factors adversely affecting the site's ecological character.
24. **Land tenure/ownership:** Details of ownership/tenure both of the Ramsar site and of the areas surrounding the site. If possible, express different tenure/ownership categories as the percentage of the site to which each applies (e.g., "50% state-owned"). Explain any complex tenure arrangements or formulas. Also explain terms which have a special meaning in the country or region concerned. In the next section (25, Current land use), describe the linkages between the different land tenures described in this section and specific land uses.
25. **Current land (including water) use:** All of the principal human activities in (a) the Ramsar site itself and (b) in the surroundings and catchment. Give information on the human population in the area, with a description of the principal human activities and main forms of land and water use at the wetland, e.g., water supply for domestic and industrial use, irrigation, agriculture, livestock grazing, forestry, fishing, aquaculture and hunting. Also mention here activities and uses related to research, education and recreation/tourism at the site, but provide the details about each of these in sections 29, 30 and 31, respectively). Some indication of the relative importance, scale and trend of each land and water use should be given whenever possible. Make note if activities or uses are restricted to certain distinct parts of the site (e.g., in only part of a large site or in distinct zones or within particular wetland types). In (b), summarize land and water use in the areas surrounding the site and in its greater catchment that may directly or indirectly affect the status of the designated wetland, and any land uses in downstream areas likely to be affected by the wetland. For further reference on water use, see the *Guidelines for the allocation and management of water for maintaining the ecological functions of wetlands* adopted by Resolution VIII.1; Resolution IX.1, Annex C (*An Integrated Framework for the Ramsar*

*Convention's water-related guidance); Annex Ci (River basin management: additional guidance and a framework for the analysis of case studies); and Annex Cii (Guidelines for the management of groundwater to maintain wetland ecological character).*

- 26. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land (including water) use and development projects:** The human and natural factors affecting the ecological character of the site, from 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. For all adverse and change factors reported, supply measurable/quantifiable information (when such data exist), as well as information on the scale, extent and trend of the change factor and its impact: this information should provide a basis for monitoring of ecological character of the site.

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. One should also distinguish between potential and existing adverse factors.

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.

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 should be detailed, in order to facilitate monitoring.

Provide information on the history of introductions (accidental or deliberate) of invasive and/or alien species identified in sections 21, Noteworthy flora and 22, Noteworthy fauna and the impacts of any invasions.

- 27. Conservation measures taken:** Provide details in the following areas, if appropriate.

- a) Mention any nationally relevant protected area status, international conservation designations (in addition to Ramsar site status), and, in the case of transboundary wetlands, bilateral or multilateral conservation measures which pertain to all or part of the site. If a reserve has been established, give the date of establishment and size of the protected area. If only a part of the wetland is included within a protected area, the area of wetland habitat that is protected should be noted.
- b) If appropriate, list the IUCN (1994) protected areas management category/ies which apply to the site. These are as follows:

Category	Definition
<b>Ia Strict Nature Reserve:</b> 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.
<b>Ib Wilderness Area:</b> 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.
<b>II National Park:</b> 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.
<b>III Natural Monument:</b> 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.
<b>IV Habitat/Species Management Area:</b> 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.
<b>V Protected Landscape/Seascape:</b> 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.
<b>VI Managed Resource Protected Area:</b> 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.

IUCN defines a “protected area” as: “An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means”.

- c) Describe here the management planning process for the site, including any management plan, if this has been developed and is being implemented, including whether it has been officially approved. Cite the management plan document(s) in section 34, Bibliographic references, and whenever possible provide a copy of the management plan as supplementary information to the RIS.
- d) Also describe any other conservation measures taken at the site, such as restrictions on development, management practices beneficial to wildlife, closures of hunting, etc.

Include information here on any monitoring schemes and survey methods in place at the site. Describe any application at the site of the Ramsar *Conceptual Framework for the wise use of wetlands and the maintenance of their ecological character* (Resolution IX.1 Annex A), or any other instance of the application of the Convention's guidance as compiled in the Ramsar 'toolkit' of Wise Use Handbooks ("wise use", i.e., sustainable use, is a central concept of the Ramsar Convention).

When updating the RIS for an existing Ramsar site, mention if the site is included on, or has been removed from, the Montreux Record and provide details of any Ramsar Advisory Missions that have been undertaken to the site.

Any application of integrated basin-scale/catchment management planning, or integrated coastal/marine zone management planning, involving or affecting the site should be noted. Provide a brief assessment of the effectiveness of protected area legislation or status of any protected areas whenever possible. Involvement of local communities and indigenous people in the participatory management of the site should also be described, in the context of the Ramsar guidelines on this process (Resolution VII.8).

28. **Conservation measures proposed but not yet implemented:** Provide details of any conservation measures that have been proposed, or are in preparation, for the site, including any proposals for legislation, protection and management. Summarize the history of any long-standing proposals which have not yet been implemented, and differentiate between those proposals which have already been officially submitted to the appropriate government authorities and those which have not as yet received formal endorsement, e.g., recommendations in published reports and resolutions from specialist meetings. Also mention any management plan which is in preparation but has not yet been completed, approved or implemented.
29. **Current scientific research and facilities:** Describe here any current scientific research programmes, including monitoring, and projects taking place in the site, and provide information on any special facilities for research that were mentioned in section 25. Current land (including water) use.
30. **Current communications, education and public awareness (CEPA) activities related to or benefiting the site:** Describe here any existing programmes, activities and facilities for communications, education and public awareness (CEPA), including training, that were mentioned in section 25, Current land (including water) use. Also provide comment on the educational potential of the wetland. For further information on CEPA issues and the Convention on Wetlands, see the Ramsar Web site at [http://ramsar.org/outreach\\_index.htm](http://ramsar.org/outreach_index.htm).
31. **Current recreation and tourism:** Provide details of any present use of the wetland for recreation and tourism that was mentioned in section 25, Current land (including water) use. Provide details of existing or planned visitor facilities or centres for recreation and tourism, and indicate the annual number of tourists visiting the site, if known. Also indicate the type of tourism and whether the tourism is seasonal.
32. **Jurisdiction:** Provide the full name and address of the government authority with a) territorial jurisdiction over the wetland, e.g., the state, region or municipality; and b) the name

of the authority with *functional jurisdiction* for conservation purposes, e.g., the Department of Environment or Department of Fisheries, etc.

33. **Management authority:** 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. Also provide details of any special or unique arrangements that pertain to the site's management.
34. **Bibliographical References:** A list of key technical references relevant to the wetland, including management plans, major scientific reports, and bibliographies, if such exist. Please list any functional/active Web site addresses dedicated to the Ramsar site or which prominently feature the site (e.g., a Web site detailing all of a country's Ramsar sites), and include the date that the Web site was most recently updated. When a large body of published material is available about the site, only the most important references need be cited, with priority being given to recent literature containing extensive bibliographies. Reprints or copies of the most important literature, including a copy of any management plan, should be appended whenever possible.

## Annex 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 herein 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 section 19 of the RIS, the Secretariat has provided below a tabulations for Marine/Coastal Wetlands and Inland Wetlands of 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**.
- 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
		Marsches	H
		Forested	I
	Lagoons	J	
Estuarine waters		F	
		Zk(a)	
Fresh water	Lagoons	K	

#### Inland Wetlands:

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

## Annex C

### Criteria for Identifying Wetlands of International Importance and Guidelines for their application

Adopted by the 7<sup>th</sup> (1999) and 9<sup>th</sup> (2005) Meetings of the Conference of the Contracting Parties, superseding earlier Criteria adopted by the 4<sup>th</sup> and 6<sup>th</sup> 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.

## **Guidelines for the application of the Criteria**

(based on the *Strategic Framework and Guidelines for the future development of the List of Wetlands of International Importance*)

### **Criterion 1:**

- 1a) In applying this Criterion systematically, Contracting Parties are encouraged to:
  - i) determine biogeographic regions within their territory or at the supranational/regional level;
  - ii) within each biogeographic region, determine the range of wetland types present (using the Ramsar Classification System for wetland type), 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 provide the best examples.
- 1b) When selecting a biogeographic regionalisation scheme to apply, it is generally most appropriate to use a continental, regional, or supranational scheme rather than a national or subnational one.
- 1c) Objective 1 and, in particular 1.2 of the *Strategic Framework*, 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. In terms of hydrological functioning, the following is provided to assist Contracting Parties consider this aspect of determining priority sites under this Criterion. For guidance relevant to biological and ecological roles refer to Criterion 2 following.
- 1d) **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 cloudforest or rainforest, wetlands or wetland complexes in semi-arid, arid or desert areas, tundra or peatland systems acting as sinks for carbon, etc.);
- vii) have a major role in maintaining high water quality standards.

**Criterion 2:**

- 2a) Ramsar sites have an important role in the conservation of globally threatened species and ecological communities. Notwithstanding the small numbers of individuals or sites that may be involved, or poor quality of quantitative data or information that may sometimes 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 Criterion 2 or 3.
- 2b) General Objective 2.2 of the Strategic Framework urges Contracting Parties to seek to include in the Ramsar List wetlands that include threatened ecological communities or are critical to the survival of species identified as vulnerable, endangered or critically endangered under national endangered species legislation/programmes or within international frameworks such as the IUCN Red Lists or Appendix I of CITES and the Appendices of CMS.
- 2c) 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 providing habitat for rare, vulnerable, endangered, or critically endangered species. Ideally, the sites in the network will have the following characteristics. They:
  - 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) are ecologically linked in other ways, such as through providing refuge areas to populations during adverse conditions; and/or
  - iv) are 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.
- 2d) 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 which 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.
- 2e) When selecting a biogeographic regionalisation scheme to apply under paragraph 2d (i) and/or (ii), it is generally most appropriate to use a continental, regional, or supra-national scheme rather than a national or subnational one.
- 2f) Note also the issues concerning habitat diversity and succession in paragraphs 46 to 49 of the Strategic Framework, “Boundary definition of sites”.
- 2g) Be aware also of the biological importance of many karst and other subterranean hydrological systems.

**Criterion 3:**

- 3a) 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 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.
- 3b) Be aware also of the biological importance of many karst and other subterranean hydrological systems.
- 3c) When selecting a biogeographic regionalisation scheme to apply, it is generally most appropriate to use a continental, regional, or supranational scheme rather than a national or subnational one.

**Criterion 4:**

- 4a) 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.

- 4b) 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 listing.

#### **Criterion 5:**

- 5a) 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.
- 5b) Non-native waterbirds should not be included within the totals for a particular site.
- 5c) 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.
- 5d) 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.
- 5e) 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. Consideration may also be given to turnover of waterbirds at migration periods, so that a cumulative total is reached, if such data are available.
- 5f) 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.
- 5g) However, accurate estimation of turnover and total number of individuals of a population or population using a wetland is difficult, and several methods (e.g., cohort marking and resighting, or summing increases in a count time-series) which have at times been applied do not yield statistically reliable or accurate estimates.

- 5h) The only currently available method which 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.
- 5i) 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 of ensuring that their management planning for the site fully recognizes this importance.

**Criterion 6:**

- 6a) 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. Consideration may also be given to turnover of waterbirds at migration periods, so that a cumulative total is reached, if such data are available.
- 6b) To ensure international comparability, where possible, Contracting Parties should use the international population estimates and 1% thresholds published and updated every three years by Wetlands International as the basis for evaluating sites for the List using this Criterion. As urged by Resolutions VI.4 (Ramsar COP6) and Resolution VIII.38 (COP8), 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 also support the national implementation and development of Wetlands International's International Waterbird Census, which is the source of much of these data.
- 6c) 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.
- 6d) 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 overall importance of the wetland for both populations through the application of Criterion 4, as the basis of 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.
- 6e) Note that this guidance applies just during the period of population mixing (often, but not exclusively, this is during periods of migration). At other times, it is generally possible to assign a 1% threshold accurately to the single population that is present.

- 6f) 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 under Criterion 5, paragraphs 5f-5i.

**Criterion 7:**

- 7a) Fishes are the most abundant vertebrates associated with wetlands. Worldwide, over 18,000 species of fishes are resident for all or part of their life cycles in wetlands.
- 7b) Criterion 7 indicates that a wetland can be designated as internationally important if it has a high diversity of fishes and shellfishes. It emphasises 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. Species counts alone are thus not sufficient to assess the importance of a particular wetland. In addition, the different ecological roles that species may play at different stages in their life cycles needs to be considered.
- 7c) Implicit in this understanding of biological diversity is the importance of high levels of endemism and of biodisparity. Many wetlands are characterised by the highly endemic nature of their fish fauna.
- 7d) 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.
- 7e) Over 734 species of fish are threatened with extinction worldwide, and at least 92 are known to have become extinct over the past 400 years. The occurrence of rare or threatened fish is catered for in Criterion 2.
- 7f) An important component of biological diversity is biodisparity, i.e., the range of morphologies and reproductive styles in a community. The biodisparity of a wetland community will be determined by the diversity and predictability of its habitats in time and space, i.e., the more heterogeneous and unpredictable the habitats, the greater the biodisparity of the fish fauna. For example, Lake Malawi, a stable, ancient lake, has over 600 fish species of which 92% are maternal mouthbrooding cichlids, but only a few fish families. In contrast, the Okavango Swamp of Botswana, a palustrine floodplain that fluctuates between wet and dry phases, has only 60 fish species but a wider variety of morphologies and reproductive styles, and many fish families, and therefore has a greater biodisparity. Measures of both biological diversity and biodisparity should be used to assess the international importance of a wetland.

**Criterion 8:**

- 8a) 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 openwater adult stages. These wetlands therefore support essential ecological processes for fish stocks, even if they do not necessarily harbour large adult fish populations themselves.
- 8b) 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.
- 8c) This is for guidance only and does not interfere with the rights of Contracting Parties to regulate fisheries within specific wetlands and/or elsewhere.

**Criterion 9:**

- 9a) 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. Consideration may also be given to turnover of individuals of migratory animals at migration periods, so that a cumulative total is reached, if such data are available (see guidance in paragraphs 5f-5i related to waterbirds which is also applicable to Criterion 9 in relation to non-avian animals).
- 9b) To ensure international comparability, where possible, Contracting Parties should use the most current international population estimates and 1% thresholds provided and regularly updated by IUCN's Specialist Groups through the IUCN Species Information Service (SIS) and published in the Ramsar Technical Report series, as the basis for evaluating sites for the List using this Criterion. An initial list of populations and recommended 1% thresholds is provided in the paper "*Population estimates and 1% thresholds for wetland-dependent non-avian species, for the application of Criterion 9*" ([http://ramsar.org/ris/key\\_ris\\_criterion9\\_2006.pdf](http://ramsar.org/ris/key_ris_criterion9_2006.pdf)).
- 9c) 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.

- 9d) It is anticipated that this Criterion will be 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. For better application of this Criterion, Contracting Parties should assist, where 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.

## Annex D

### 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, and also 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: <http://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 recognises 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) waypoints.
3. Maps provided by a Contracting Party on designation of a Ramsar site should, as far as possible, and as high priority attributes:
  - i) 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;
  - ii) 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;
  - iii) clearly show the boundary of the Ramsar site, and distinguish this from any existing or proposed buffer zones;
  - 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 boundary and each other category of feature shown on the map and relevant to the designation of the site; and

- vi) show the map's scale, an indication of geographical coordinates (latitude and longitude), an indication of compass bearing (north arrow) and, if possible, information on the map's projection. The map (or a companion map) should also show the position of several other features if feasible.
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 in paragraph 3 above:
- i) basic topographical information;
  - ii) the boundaries of relevant protected area designations 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. A map having all the above attributes, including being at the appropriate scale (see guidance below), will facilitate digitization of maps for inclusion in a Geographic Information System (GIS) if the map (or maps) are supplied only in printed form (i.e., when no digital coordinates are available).
8. To allow for subsequent digitization to be undertaken accurately and without distortion, the map should be an original print (two copies of which should be supplied) and not a photocopy.
9. Additionally, to facilitate copying and presentation, it is extremely helpful to include two other versions of the principal map(s):
- i) a colour photocopy of the map reduced to A4 size;
  - ii) a GIS file providing geo-referenced site boundary vectors and attribute tables, if possible;
  - iii) a TIFF, JPG, BMP, GIF or other common digital image file..

#### Scale of maps

10. 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:

<b>Size of site (ha)</b>	<b>Preferred (minimum) scale of map</b>
> 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

11. 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.
12. For moderate to large sites, it is often difficult to show sufficient detail on standard A4 (210mm x 297mm) 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 (420mm x 297 mm) as larger formats present difficulties for subsequent copying.
13. When the site is large or complex and/or when it is composed of several sub-sites with discrete boundaries, a larger-scale map of each section or sub-site should be provided, accompanied by a smaller 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)**

14. When detailed topographical maps are not available, a description of the boundaries of the site should be 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.
15. 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 or paper file listing each GPS latitude/longitude way-point determined and identifying these on a printed copy of the site map.
16. 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.

#### **Boundary description (digital)**

17. Contracting Parties are encouraged, where possible, to submit geographic information about the Ramsar site in digital form, suitable for incorporation into a Geographic Information System (GIS).
18. For boundary and buffer zone delineation, data should be presented in vector form, prepared at the largest scale.
19. 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 largest scale possible.
20. Metadata concerning the digitised formats should accompany the digital map(s) and should include digitising scale, projection system, attribute tables for each map layer, file format(s), and layering conventions used to prepare the data layers.
21. The primary native format files generated by the “Arc-Info” family of GIS (ESRI Corporation) or by “MapInfo” (Corporation) GIS enjoy increasingly wide use and can be imported and used by many GIS applications.
22. The Open GIS Consortium (OGC), a large group of GIS organizations including industry leaders, is addressing the issue of incompatible standards in geographic information technology. Progress on GIS standards, compatibility, and interoperability achieved under the OGC initiative should be noted and will be considered in the preparation of any updated advice on GIS file specifications for provision of digital maps for Ramsar sites.

## Appendix E

### 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 regionalisation which is determined by the Contracting Party to provide the most scientifically rigorous approach possible at the time.

**biodisparity** (Guidelines for Criteria 7 & 8) - the range of morphologies and reproductive styles in a community. The biodisparity of a wetland community is determined by the diversity and predictability of its habitats in time and space.

**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 [Delany & Scott (2002)], 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 laid 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 laid out in the *IUCN Red List Categories and Criteria: Version 3.1.* (IUCN 2001)]. See also ‘globally threatened species’ below.

**endemic species** (Guidelines for 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 (*Asciidiacea*)

**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** (section IV.1) - 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  $\text{CaCO}_3$ , 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, saucer-shaped, 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,  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ .

*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.

**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.

**survival** (long-term target for Criterion 2) - 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.

**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.

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.