

Glossary of terms used in the *Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance of the Convention on Wetlands (Ramsar, Iran, 1971)*, 3d ed. (2006)

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*] See also 'globally threatened species' below.

critical stage (Criterion 4) - meaning stage of the life cycle of wetland-dependent species. Critical stages being those activities (breeding, migration stopovers etc.) which if interrupted or prevented from occurring may threaten long-term conservation of the species. For some species (Anatidae for example), areas where moulting occurs are vitally important.

ecological character - the combination of the ecosystem components, processes and benefits/services that characterise the wetland at a given point in time. [Within this context, ecosystem benefits are defined in accordance with the MA definition of ecosystem services as "the benefits that people receive from ecosystems".] (Resolution IX.1 Annex A)

ecological communities (Criterion 2) - any naturally occurring group of species inhabiting a common environment, interacting with each other especially through food relationships and relatively independent of other groups. Ecological communities may be of varying sizes, and larger ones may contain smaller ones.

ecotone (Criterion 2) - a narrow and fairly sharply defined transition zone between two or more different communities. Such edge communities are typically rich in species.

endangered (Criterion 2) - as used by the Species Survival Commission of IUCN. A taxon is Endangered when it is not Critically Endangered but is facing a very high risk of extinction in the wild in the near future, as defined [for both animals and plants by the criteria layed out in the *IUCN Red List Categories and Criteria: Version 3.1.*(IUCN 2001)]. See also 'globally threatened species' below.

endemic species (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 (or *endorrheic*) - 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 (Myxiniiformes)
- 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, salmon and allies (*Salmoniformes*)
- mullets (*Mugiliformes*)
- silversides (*Atheriniformes*)
- halfbeaks (*Beloniformes*)
- killifishes and allies (*Cyprinodontiformes*)
- sticklebacks and allies (*Gasterosteiformes*)
- pipefishes and allies (*Syngnathiformes*)
- cichlids, perches and allies (*Perciformes*)
- flatfishes (*Pleuronectiformes*)

iv) **Several groups of shellfishes:**

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

v) **Certain other aquatic invertebrates:**

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

fish stock (Criterion 8) - the potentially exploitable component of a fish population.

flagship species - species that appeal to the public and have other features that make them suitable for communicating conservation concerns.

flyway (Guideline for Criterion 2) - the concept developed to describe areas of the world used by migratory waterbirds and defined as the migration routes(s) and areas used by waterbird populations in moving between their breeding and wintering grounds. Each individual species and population migrates in a different way and uses a different suite of breeding, migration staging and wintering sites. Hence a single flyway is composed of many overlapping migration systems of individual waterbird populations and species, each of which has different habitat preferences and migration strategies. From knowledge of these various migration systems it is possible to group the migration routes used by waterbirds into broad flyways, each of which is used by many species,

often in a similar way, during their annual migrations. Recent research into the migrations of many wader or shorebird species, for example, indicates that the migrations of waders can broadly be grouped into eight flyways: the East Atlantic Flyway, the Mediterranean/Black Sea Flyway, the West Asia/Africa flyway, the Central Asia/Indian sub-continent Flyway, the East Asia/Australasia Flyway, and three flyways in the Americas and the Neotropics.

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

globally threatened species (Criteria 2, 5 & 6) - species or subspecies which are listed by IUCN Species Survival Commission's Specialist Groups or Red Data Books as either Critically Endangered, Endangered or Vulnerable. Note that, especially for invertebrate taxa, IUCN's Red Data listings may be both incomplete and dynamic, reflecting poor knowledge of the global status of many taxa. Interpretation of the terms 'vulnerable', 'endangered' or 'critically endangered' species should thus always be undertaken at a national level in the light of the best available scientific knowledge of the status of the relevant taxa.

hydromorphic soils - waterlogged soils which develop under conditions of poor drainage in marshes, swamps, seepage areas, or flats.

importance (long-term target for Criterion 2) - sites, the protection of which will enhance the local and thus global long-term viability of species or ecological communities.

indicator species - species whose status provides information on the overall condition of the ecosystem and of other species in that ecosystem; taxa that are sensitive to environmental conditions and which can therefore be used to assess environmental quality.

indigenous species (Criterion 7) - a species that originates and occurs naturally in a particular country.

introduced (non-native) species - a species that does not originate or occur naturally in a particular country.

karst (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 CaCO_3 , the major component of carbonate rocks including limestone and marble.

Carbonate rock: a rock consisting of one or more carbonate minerals.

Cave: A natural hole in the ground, large enough for human entry. This does not include hydrologically very significant, conduits or fissures. A cave may be a single, short length of accessible passage, or an extensive and complex network of tunnels as long as the hundreds of kilometers in the Flint Mammoth Cave System. Most caves are formed by dissolution in limestone but sandstone caves, lava caves, glacier caves and tectonic caves also occur. In some countries a cave is regarded as being a horizontal opening, as opposed to a pothole, or jama, which is a vertical opening, or natural vertical shaft.

Cave lake: any underground lake, it may be the entrance to a sump, in vadose caves formed by ponding behind banks of sediment or gour barriers.

Chamber: an enlargement in a cave passage or system. The largest chamber currently known, Sarawak Chamber in Sarawak, is over 700m long, up to 400m wide and 70m high.

Classical Karst: the region called Kras in Slovenia, which gave its name to the karst landscape.

Conduit: dissolutional voids, including enlarged fissures and tubular tunnels; in some usage the term is restricted to voids that are water-filled.

Conduit flow: underground water flow within conduits.

Corrosion: the erosion of rock by chemical activity that leads to dissolution.

Doline: a circular closed depression, saucershaped, conical or in some cases cylindrical. Dolines may form by dissolution, collapse, or a combination of these. They are ubiquitous features of limestone karst, but can form in or above any soluble rock; subsidence dolines are developed in insoluble sediment leached or collapsed into an underlying cavernous limestone. The largest dolines in Slovenia, Smrekova draga for instance, are more than 1 km long and over 100 m 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 180 km 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 643 m 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 phreatic 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 phreatic. 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 130 km.

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 laid 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.