

CONVENTION ON WETLANDS (Ramsar, Iran, 1971)
CONVENTION SUR LES ZONES HUMIDES (Ramsar, Iran, 1971)
CONVENCION SOBRE LOS HUMEDALES (Ramsar, Irán, 1971)

Proceedings | Procès-verbaux | Actas (Brisbane, 1996), Vol. 10/12



Technical Session / Séance Technique / Sesión Técnica



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Summary Report of Technical Session E

“Criteria for Identifying Wetlands of International Importance”

Chair: Mr Abdoulaye N’Daiye (Senegal)

Vice Chair: Mr Mihály Végh (Hungary)

Secretariat: Dr Montserrat Carbonell (Ramsar Bureau)

Keynote Presentations

“The Importance of Fishes and Fisheries in Wetlands: the Need for an Additional Ramsar Criterion for the Designation of Sites of International Importance Based on Their Fish and Fisheries,” Dr Michael Bruton, Two Oceans Aquarium, South Africa

“The Need for Improving Coverage of Plants and Invertebrates in the Existing Ramsar Criteria and Guidelines,” Dr Peter Bacon, University of the West Indies, Trinidad & Tobago

“Estimating International Waterbird Populations: the Use of Criterion 3(c),” Mr David Stroud, Joint Nature Conservation Committee, UK

The Chair

1. indicated that the business and expected output of Technical Session E concerned three Draft Resolutions, namely Resolutions VI.2, VI.3, and VI.4.

The Vice Chair

2. as a member of the Scientific and Technical Review Panel, gave the background to the work done together with other experts, as recommended in Recommendation 5.9 of the Kushiro Meeting of the COP, in relation to the proposed new criteria for fish and fisheries. He also indicated that the STRP had considered the need for reviewing the existing criteria but not to change them.

Dr Bruton

3. detailed six characteristics which demonstrated the importance of fishes in wetlands (biodiversity and biodiversity, endemism, threatened status, productivity and yield, ecological roles, and economic value); he outlined the proposed 4th Criterion and defined its terms. He referred to changes to the criteria proposed by **Australia** and **WWF**. He concluded that the 4th Criterion would greatly enhance the relevance of the Convention in the developing world, and would stimulate fish research and conservation, to the benefit of many, but that the guidelines should be used holistically, based on the catchment management approach adopted by the Convention. Two countries had tested the proposed criteria with the result that new sites had been identified, all of them coastal; the criteria also strengthened the international importance of the already listed sites.

Dr Bacon

4. focused his paper on plants and invertebrates but was not prepared to propose new criteria for these groups. Greater consideration should be paid to freshwater and marine plants to identify important wetlands. These can be accommodated under Criterion 1 but their botanical features and in some cases their uniqueness needs to be highlighted. Inclusion of plant type in identification criteria permits wetland monitoring by remote sensing, providing a more sensitive method for gauging wetland health and status. Plants may also serve as indicators of ambient environmental conditions, particularly as these relate to hydrology. The presence and distribution patterns of plants could be used to relate Ramsar criteria more directly to wetland functional values. Wetland invertebrates have important ecological roles (food webs, decomposition) and economic values. Their presence and roles can largely be inferred by study of wetland vegetation distribution. Existing Criteria 1 and 2, and proposed Criterion 4, provide adequate coverage for wetland invertebrate values.

- Mr Stroud**
5. recommended that international waterfowl population estimates be updated every three years, but that 1% thresholds should be revised every nine years, enabling them to act as a benchmark against which the importance of individual sites can be measured.

- New Zealand, Norway, Sweden, and Iceland**
6. welcomed fish as a criterion but expressed concern about the inclusion of fisheries in proposed Criterion 4(c). The proposed formulation would lower the threshold for listing sites and lead to too many new designations. The term “fish stocks” was preferred.

- Australia**
7. wished the fish definitions to include other families, such as Thryamids and Cyramids.

- The UK**
8. expressed a number of anxieties about further measures which could lead to conflict or overlap with existing national and/or regional regulations. Consideration of fish and fisheries should be considered under the terms of Criterion 2, and guidelines in relation to fish and fisheries should be developed at regional or national levels.

- Interventions**
9. suggesting small amendments to Draft Resolution VI.2 came from **Italy, Trinidad & Tobago, the Nature Conservation Council of New South Wales, and the Inland Rivers Network of Australia**, but were generally supportive. **Sri Lanka** supported the incorporation of fish, plant and hydrological functions, and the review of existing criteria to facilitate identification of internationally important wetlands of types currently under-represented. **IUCN** stressed the need for hydrological functions to be considered and was preparing a recommendation. **Chile and Ghana** thought that the inclusion of fish criteria was advantageous but the lack of financial resources to obtain needed information was a concern.

- France**
10. had successfully tested the guidelines and identified important sites which the other criteria had not. The use of fish criteria had helped to incorporate whole catchments, just as the bird criteria help to bridge wetlands in different continents through flyway networks.

- Guinea Bissau and Israel**
11. supported Draft Resolution VI.2 and indicated that it would help in identifying new sites and in acceding to the Convention respectively.

- Australia**
12. supported Draft Resolution VI.3 because of concern at the growing number of criteria, and suggested giving consideration to bringing them together.

- WWF**
13. stated that passerines ecologically dependent on wetlands should be taken into account when identifying, nominating or reporting on wetlands of international importance.

- Belgium**
14. felt that, with the adoption of fish and fisheries criteria, the time had come to change the name of the Convention. **The Slovak Republic** supported this view.

- Dr Bruton**
15. answered the queries addressed to him through the interventions and stated that the guidelines can continue to be modified so as to make them applicable both regionally and globally. He agreed with the use of the word “stocks” in place of “fisheries” in Criterion 4(c).

Dr Bacon

16. in relation to his presentation, agreed with New Zealand's view that it was sensible to use plants as indicators for designating sites, especially concerning ephemeral wetlands. He shared the Slovak Republic's concern over the classification of wetland types and suggested that an ecosystem approach is required in the criteria.

The Chair

17. asked for written statements to be passed to the redrafting committee, which would look at Draft Resolutions VI.2 and VI.3. This would comprise Norway, New Zealand, the UK, Trinidad & Tobago, Senegal, South Africa, Dr Bruton, Dr Bacon, and Bureau staff. [Subsequently, Iceland replaced Norway.]

Rapporteur: Tim Davis

Abstracts

“The Importance of Fishes and Fisheries in Wetlands: the Need for an Additional Ramsar Criterion for the Designation of Sites of International Importance Based on Their Fish and Fisheries” (abstract)

Mike N. Bruton, Two Oceans Aquarium, South Africa

1. The importance of fishes in wetlands needs to be more widely recognised, notwithstanding their invisibility and lack of charisma relative to birds. Fishes are the most abundant and diverse vertebrates associated with wetlands; worldwide over 18,000 species of fishes are resident for at least part of their life cycle in wetlands as defined by the Ramsar Convention. Fishes play vital ecological roles in the functioning of these wetlands and in the ecosystems to which they are linked. Many freshwater wetlands have threatened, endemic fish communities, and coastal wetlands typically have high diversities of fishes and act as spawning grounds, nurseries and/or feeding grounds for offshore fish communities, many of which are of economic importance. As wetlands of importance as waterfowl habitat may not be important as fish habitat, it cannot be presumed that the conservation of wetlands for waterfowl will conserve representative communities of wetland fishes as well. Wetlands whose uniqueness is derived from the characteristics of their fish communities, and the role that they play in the socio-economic well-being of dependent human fishing communities, therefore need to be recognised as internationally important by the Ramsar Convention. As none of the existing criteria cater adequately for the characteristics of wetland fishes and fisheries, an additional, fourth criterion for the designation of wetlands of international importance on the basis of these features is therefore proposed, with appropriate guidelines.
2. The adoption of this fourth criterion will facilitate the designation of additional important wetlands, without devaluing current Ramsar sites, based on criteria that are relevant to many tropical, subtropical and temperate countries, especially for wetlands with significant fish populations but insignificant bird communities. The objective of this fourth criterion is to provide protection for the ecological basis of important fish communities and fisheries so that they remain sustainable in the long term without changing their ecological character, in accordance with the Wise Use guidelines, and in such a way that there is no interference with the rights of local authorities or communities to regulate the fisheries.

“The Need for Improving Coverage of Plants and Invertebrates in the Existing Ramsar Criteria and Guidelines” (abstract)

Peter R Bacon, University of the West Indies, Trinidad & Tobago

1. Plants, particularly the various hydrophyte species, are the basis of all wetland food chains that support waterfowl, fish and other organisms. Some of the highest levels of primary production occur in wetland plant communities, particularly marshes, mangroves, seagrass beds and floodplain forests. In

addition, several families of hydrophytes occur only in wetlands and many flowering plant and algal species are most abundant in these habitats. Large swamps and marshes frequently contain a significant proportion of a region's plant diversity, while algal communities associated with reefs and shallow coastal areas are among the most diverse and productive in marine benthic environments. An extensive range of plant resources is extracted from wetlands, for fuel, food, fodder construction materials, medicines, dyes and horticulture, and these provide livelihood to considerable numbers of people, particularly at the subsistence level. This direct contribution of wetland plants to regional economies, together with indirect linkages through food chain support to fisheries, suggest that greater consideration should be paid to freshwater and marine plants in formulating criteria for distinguishing wetlands of international importance.

2. Although covered to some extent in existing Criteria 1 - 2 (but not in Criterion 3 or proposed Criterion 4), a new Criterion is required which recognises plants specifically as a fundamental component of wetlands. A proposed Criterion addresses: plant diversity, endemism, productivity, food-chain support and economic value.
3. Invertebrates are a major food source for waterfowl, being more important than fish as food organisms for many species. They also provide food, or food chain support, to many fish, amphibian, reptile and mammal populations in freshwater and marine wetland habitats. Several aquatic invertebrate taxa are restricted to wetland habitats and the level of endemism is high in some of the more isolated sites. Many wetland invertebrates are of direct commercial value, particularly at the subsistence level. Some valuable resource organisms, such as oysters and mussels, are virtually confined to wetlands. This suggests that a Criterion recognising invertebrate diversity, abundance and economic value might be useful in selecting wetlands of international importance.
4. However, it is thought that existing Criteria 1 & 2, and proposed Criterion 4, provide adequate coverage for wetland invertebrate values. What is needed is for explanatory notes and definitions accompanying these Criteria to be expanded to make specific mention of invertebrate diversity and economic value.

“Estimating International Waterbird Populations: the Use of Criterion 3(c)” (abstract)

David A Stroud, UK Joint Nature Conservation Committee

1. The 1% criterion (Criterion 3c) has for many years been used to identify wetlands of international importance for their waterfowl populations, especially those which should be brought within the list of sites conserved under the Ramsar Convention. The criterion identifies sites as of international importance if 1% of the waterfowl of a particular migratory flyway or population regularly make use of a wetland at any time during their annual cycle. This simple, and globally applicable criterion, to which other criteria have more recently been added, has played a major role in the identification and listing of sites under the Ramsar Convention.
2. The wide use of this numerical criterion in site selection depends crucially however, on the establishment of the size of the international waterfowl population concerned. This provides the necessary baseline from which the 1% threshold is derived for any species or population. The long-term collection of baseline data has been undertaken through the International Waterfowl Census of Wetlands International, itself working with and alongside other national or international counting schemes, and specialist surveys for particular taxa.
3. The revision of international population estimates has, until now, been undertaken previously on an *ad hoc* basis, with the last major reviews of Western Palearctic waders and Anatidae being presented at the 1987 Ramsar meeting in Regina. There has formerly been no internationally agreed timetable for the revision of population estimates and 1% thresholds.

4. A small international workshop was recently organised to consider current activity and future needs for the estimation of international waterfowl population sizes in the Western Palearctic and the uses of these data, especially with respect to the requirements of the Ramsar Convention.
 5. First, it reviewed the current mechanisms for the coordination of information necessary to assess international population sizes of waterfowl. This concentrated especially on the identification of the different uses of these data and the basic requirements of the different groups of data “users” (e.g. researchers, national and international NGOs, government conservation bodies, conventions and ministries). The meeting made recommendations for further improvements to current mechanisms, especially in the light of the Ramsar’s Resolution C.5.9 that international waterfowl population estimates be updated every three years in line with meetings of the Contracting Parties. It was noted however, that it was important that 1% thresholds do not change too rapidly in response to minor population changes: they should act as “bench-marks” against which the importance of individual sites can be assessed.
 6. The workshop recommended two cycles of review to be undertaken:
 - a three year cycle of revision of population estimates for Western Palearctic waterfowl (i.e. for every Ramsar Conference); and
 - a nine year cycle of revision of 1% thresholds for Western Palearctic waterfowl every third Ramsar meeting), unless major population change occurs.
 7. In undertaking these reviews, a two stage model is proposed:
 - first, separate taxa-related reviews will be produced by Wetland International’s Research Groups, Database coordinators and others to an agreed forward plan; and
 - second, a global summary report drawing on review papers will be published by Wetlands International.
 8. The meeting noted the great importance of ensuring that one internationally-agreed set of officially reported population levels were available for use by both the Ramsar and Bonn Conventions, and other international treaties. Wetlands International has an important role in coordinating the establishment of common protocols on the use and revision of these data.
 9. The workshop focused on the issues surrounding waterfowl population estimates in the Western Palearctic, but throughout many of the points under discussion were relevant also to other parts of the world, and it recommended that future discussions should include representatives from other regions.
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Rapport Résumé de la Séance Technique E

«Critère d'identification des zones humides d'importance internationale»

Président: Abdoulaye N'Daiye (Sénégal)

Vice-président: Mihály Végh (Hongrie)

Secrétariat: Montserrat Carbonell (Bureau Ramsar)

Exposé liminaire

«Importance des poissons et des pêcheries dans les zones humides: nécessité de disposer d'un Critère Ramsar supplémentaire pour inscrire des sites d'importance internationale pour les poissons et les pêcheries», Michael Bruton, Two Oceans Aquarium, Afrique du Sud.

«Nécessité d'améliorer la couverture des plantes et des invertébrés dans les Critères et Lignes Directrices de la Convention de Ramsar», Peter Bacon, University of the West Indies, Trinité-et-Tobago

«Estimation des populations internationales d'oiseaux d'eau: application du Critère 3(c)», David Stroud, Joint Nature Conservation Committee, Royaume-Uni

Le Président

1. indique que l'ordre du jour et les résultats attendus de la Séance technique E concernent trois projets de Résolutions, à savoir les Résolutions VI.2, VI.3 et VI.4.

Le Vice-président

2. en sa qualité de membre du Groupe d'évaluation scientifique et technique, résume les travaux qui ont été accomplis en collaboration avec d'autres experts, conformément à la Recommandation 5.9 de la Conférence de Kushiro, au sujet des nouveaux critères proposés pour les poissons et les pêcheries. Il indique également que le GEST a envisagé la nécessité de réviser les critères existants mais non de les modifier.

Mike N. Bruton

3. décrit en détail six caractéristiques démontrant l'importance des poissons dans les zones humides (diversité biologique et biodiversité, endémicité, menaces, productivité et rendement, rôles écologiques, et valeur économique); il décrit le 4e Critère proposé et en définit les termes. Il renvoie aux changements proposés par l'**Australie** et le **WWF**. Il conclut que le 4e Critère renforcerait considérablement la pertinence de la Convention dans les pays en développement et stimulerait la recherche sur les poissons et la conservation, pour le bien de nombreuses personnes. Il estime cependant que les Lignes directrices devraient être appliquées de façon holistique, en adoptant, en matière de gestion, une approche fondée sur l'ensemble du bassin versant, comme l'a recommandé la Conférence de Kushiro. Deux pays ont mis à l'épreuve les critères proposés, ce qui leur a permis d'identifier de nouveaux sites, tous côtiers; les critères renforcent également l'importance internationale des sites déjà inscrits sur la Liste.

Peter R. Bacon

4. oriente son exposé vers les plantes et les invertébrés mais n'est pas disposé à proposer de nouveaux critères pour ces groupes. Il conviendrait, à son avis, de tenir davantage compte des plantes d'eau douce et des plantes marines pour identifier les zones humides importantes. Bien que le Critère 1 couvre ces espèces dans une certaine mesure, leurs caractéristiques botaniques et, dans certains cas, leur caractère unique mériteraient d'être soulignés. L'inclusion de types de plantes dans les critères d'identification permet d'assurer la surveillance continue des zones humides par télédétection, qui constitue une méthode plus sensible pour évaluer la santé et l'état d'une zone humide. Les plantes peuvent aussi servir d'indicateur des conditions écologiques ambiantes, en particulier pour ce qui est de l'hydrologie. La présence et le mode de distribution des plantes pourraient être pris en compte afin d'associer plus directement les Critères Ramsar aux valeurs fonctionnelles des zones humides. Les

invertébrés des zones humides jouent des rôles écologiques importants (chaîne trophique, décomposition, etc.), et ont des valeurs économiques. Leur présence et leurs rôles sont faciles à déduire à partir de l'étude de la végétation d'une zone humide. Les Critères 1 et 2 existants ainsi que le Critère 4 proposé fournissent une couverture adéquate pour les valeurs des invertébrés des zones humides.

David Stroud

5. recommande de mettre à jour tous les 3 ans les estimations internationales des populations d'oiseaux d'eau, mais de réviser tous les 9 ans le critère de 1%, afin de disposer d'un point de référence pour mesurer l'importance de sites individuels.

La Nouvelle-Zélande, la Norvège, la Suède et l'Islande

6. se déclarent satisfaites de l'utilisation des poissons en tant que critère mais craignent que le terme pêcheries, utilisé dans le Critère 4(c) proposé, ne pose des problèmes. La formulation proposée abaisserait en effet le seuil pour l'inscription de sites sur la Liste Ramsar et entraînerait une pléthore de nouvelles désignations. En conséquence, il serait préférable d'utiliser le terme «stocks de poissons».

L'Australie

7. souhaite que les définitions des poissons incluent d'autres familles, telles que les Thyramidés et Cyramidés.

Le Royaume-Uni

8. exprime un certain nombre de préoccupations quant aux nouvelles mesures susceptibles d'être incompatibles ou de faire double emploi avec les réglementations nationales et/ou régionales existantes. Il conviendrait de tenir compte des poissons et des pêcheries dans le cadre du Critère 2, et d'élaborer des lignes directrices relatives aux poissons et aux pêcheries à l'échelon régional ou national.

Interventions

9. des amendements mineurs et généralement positifs sont proposés au projet de Résolution VI.2 par **l'Italie, la Trinité-et-Tobago, Nature Conservation Council of New South Wales, et Inland Rivers Network of Australia**. Le **Sri Lanka** est en faveur de l'inclusion des poissons, des plantes et des fonctions hydrologiques, ainsi que de la révision des critères existants pour faciliter l'identification des zones humides d'importance internationale qui appartiennent à une catégorie sous-représentée. L'**UICN** souligne la nécessité de tenir compte des fonctions hydrologiques et prépare une recommandation dans ce sens. Le **Chili** et le **Ghana** estiment que l'inclusion des critères relatifs aux poissons est avantageuse mais se déclarent préoccupés par le manque de ressources financières pour l'obtention des informations nécessaires.

La France

10. a mis à l'épreuve les Lignes directrices avec succès, et a pu ainsi identifier des sites importants qui n'avaient pas pu l'être avec les autres critères. L'utilisation des critères relatifs aux poissons a aidé à incorporer des bassins versants entiers, tandis que les critères relatifs aux oiseaux ont aidé à jeter un pont entre des zones humides de différents continents grâce aux réseaux de migration.

La Guinée-Bissau et Israël

11. appuient le projet de Résolution VI.2, estimant qu'il aidera à identifier de nouveaux sites et facilitera l'adhésion à la Convention.

L'Australie

12. appuie le projet de Résolution VI.3 en raison des préoccupations suscitées par le nombre grandissant de critères et suggère d'envisager de les regrouper.

Le WWF

13. déclare que les passereaux écologiquement tributaires des zones humides devraient être pris en compte lors de l'identification et de la désignation des zones humides d'importance internationale, ainsi que de la préparation des rapports y relatifs.

La Belgique

14. estime qu'avec l'adoption des critères relatifs aux poissons et aux pêcheries, le moment est venu de modifier le nom de la Convention. La **République Slovaque** partage cet avis.

Mike Bruton

15. répond aux questions qui lui ont été adressées par les intervenants et déclare que les Lignes directrices peuvent continuer à être modifiées afin de devenir applicables sur le plan tant régional que mondial. Il est d'accord avec la proposition de remplacer le terme «pêcheries» par «stocks de poissons» dans le Critère 4(c).

Peter Bacon

16. concernant son exposé, partage le point de vue de la Nouvelle-Zélande qui estime qu'il serait avisé d'utiliser les plantes comme indicateur pour l'inscription de sites, notamment pour ce qui est des zones humides éphémères. Il partage la préoccupation de la République slovaque quant à la classification des types de zones humides et estime que l'approche fondée sur l'écosystème s'impose pour les critères.

Le Président

17. demande que des déclarations écrites soient transmises au Comité chargé du remaniement, qui étudiera les projets de Résolutions VI.2 et VI.3. Ce comité pourrait être composé de représentants de la Norvège, de la Nouvelle-Zélande, du Royaume-Uni, de la Trinité-et-Tobago, du Sénégal, de l'Afrique du Sud, ainsi que de Mike Bruton et Peter Bacon, et de membres du personnel du Bureau. [Ultérieurement, l'Islande est venue remplacer la Norvège.]

Résumés

“Importance des Poissons et des Pêcheries dans les Zones Humides: Necessite de Disposer d'un Critère Ramsar Supplémentaire pour Inscrire des Sites d'Importance Internationale pour les Poissons et les Pêcheries” (résumé)

Mike N. Bruton, Two Oceans Aquarium, Afrique du Sud

1. L'importance des poissons dans les zones humides doit être plus largement reconnue, même s'ils sont plus discrets et moins charismatiques que les oiseaux. Les poissons sont les vertébrés les plus abondants et les plus divers associés aux zones humides; dans le monde entier, plus de 18.000 espèces de poissons sont résidents, durant une partie au moins de leur cycle de vie, dans les zones humides telles qu'elles sont définies par la Convention de Ramsar. Les poissons jouent un rôle écologique vital dans le fonctionnement de ces zones humides et dans les écosystèmes auxquels elles sont liées. Beaucoup de zones humides d'eau douce possèdent des communautés de poissons endémiques menacées. Les zones humides côtières ont, de manière typique, une diversité élevée de poissons et servent de frayères, de nurseries et/ou de zones de nourrissage pour des communautés de poissons marins qui ont, dans bien des cas, une importance économique. Etant donné que les zones humides importantes comme habitats des oiseaux d'eau ne sont pas toujours importantes en tant qu'habitats des poissons, on ne saurait présumer que la conservation des zones humides pour les oiseaux d'eau permette aussi de conserver des communautés représentatives des poissons des zones humides. Les zones humides dont le caractère unique vient des caractéristiques de leurs communautés de poissons et du rôle qu'ils jouent dans le bien-être socio-économique des communautés de pêcheurs qui en dépendent, doivent donc être reconnues comme d'importance internationale par la Convention de Ramsar. Aucun des critères actuels ne traitant de manière appropriée les caractéristiques des poissons et des pêcheries des zones humides, nous proposons donc un quatrième critère pour l'inscription de zones humides d'importance internationale en fonction de ces caractéristiques, assorti de lignes directrices appropriées.

2. L'adoption de ce quatrième critère facilitera l'inscription d'autres zones humides importantes, sans dévaluer les sites Ramsar actuels, en se fondant sur des critères qui sont importants pour de nombreux pays tropicaux, subtropicaux et tempérés, en particulier pour les zones humides possédant d'importantes populations de poissons mais des communautés d'oiseaux insignifiantes. L'objectif de ce quatrième critère est d'assurer une protection au fondement écologique d'importantes communautés de poissons et de pêcheries afin qu'elles restent stables à long terme sans que soient modifiées les caractéristiques écologiques, conformément aux lignes directrices sur l'utilisation rationnelle et sans préjudice des droits des autorités ou communautés locales à réglementer les pêcheries.
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**“Necessite d'Ameliorer la Couverture des Plantes et des Invertebres
dans les Criteres et Lignes Directrices de la Convention de Ramsar” (résumé)**

Peter R Bacon, University of the West Indies, Trinité-et-Tobago

1. Les plantes et, en particulier, les diverses espèces hydrophiles, sont à la base des chaînes trophiques des zones humides qui entretiennent les oiseaux d'eau, les poissons et d'autres organismes. C'est dans certaines communautés végétales, en particulier dans les marais, les mangroves, les herbiers marins et les forêts alluviales, que l'on trouve certains des taux de productivité primaire les plus élevés. En outre, plusieurs familles d'hydrophiles ne sont présentes que dans les zones humides et de nombreuses espèces de plantes à fleur et d'algues sont surtout abondantes dans ces habitats. Les grands marécages et marais contiennent fréquemment une proportion significative de la diversité des plantes d'une région tandis que des communautés d'algues associées aux récifs et aux zones côtières peu profondes sont parmi les milieux marins benthiques les plus divers et les plus productifs. Des zones humides, on extrait des ressources végétales très variées qui fournissent des combustibles, des biens alimentaires, du fourrage, des matériaux de construction, des substances médicinales, des teintures ou des produits d'horticulture et qui assurent les moyens de subsistance d'un très grand nombre de personnes. Cette contribution directe des plantes des zones humides aux économies régionales ainsi que leur contribution indirecte à travers l'appui qu'elles apportent aux pêcheries, par l'intermédiaire de la chaîne trophique, laisse à penser qu'il serait bon de prendre en compte les plantes d'eau douce et les plantes marines dans la formulation de critères permettant de décrire des zones humides d'importance internationale.
 2. Bien que les critères 1-2 actuels (mais ni le critère 3, ni le critère 4 proposé) couvrent ces espèces dans une certaine mesure, il faudrait un nouveau critère qui reconnaisse spécifiquement les plantes comme composantes fondamentales des zones humides. Le critère proposé porte sur: la diversité des plantes, l'endémisme, la productivité, le rôle dans la chaîne trophique et la valeur économique.
 3. Les invertébrés sont une source alimentaire essentielle pour les oiseaux d'eau et sont même plus importants que les poissons dans l'alimentation de nombreuses espèces. Ils servent aussi d'aliments ou apportent une contribution alimentaire, par l'intermédiaire de la chaîne trophique, à de nombreux poissons, amphibiens, reptiles et mammifères dans les habitats des zones humides d'eau douce et marine. Plusieurs taxons d'invertébrés aquatiques sont inféodés aux habitats des zones humides et le niveau d'endémisme est élevé dans certains des sites les plus isolés. Beaucoup d'invertébrés des zones humides ont une valeur commerciale directe, notamment une valeur de subsistance. Certains organismes précieux tels que les huîtres et les moules sont pratiquement inféodés aux zones humides. Il en résulte qu'un critère reconnaissant la diversité des invertébrés, leur abondance et leur valeur économique pourrait être utile pour choisir les zones humides d'importance internationale.
 4. Toutefois, les critères 1 et 2 existants ainsi que le critère 4 proposé semblent fournir une couverture adéquate pour les valeurs des invertébrés des zones humides. Ce qu'il faut c'est compléter les notes explicatives et les définitions accompagnant ces critères pour mentionner spécifiquement la diversité et la valeur économique des invertébrés.
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**“Estimation des Populations Internationales d’Oiseaux d’Eau:
Application du Critère 3(c)” (résumé)**

David A Stroud, UK Joint Nature Conservation Committee

1. Le critère de 1% (critère 3c) est utilisé depuis de nombreuses années pour identifier des zones humides d’importance internationale pour leurs populations d’oiseaux d’eau, en particulier celles qui devraient être inscrites sur la Liste des sites Ramsar. Le critère détermine que les sites sont d’importance internationale si l’on y trouve 1% des oiseaux d’eau d’une voie de migration particulière ou une population qui utilise régulièrement une zone humide à tout moment de son cycle annuel. Ce critère simple et applicable au niveau mondial, auquel d’autres critères ont récemment été ajoutés, a joué un rôle essentiel dans l’identification et l’inscription de sites à la Convention de Ramsar.
2. L’usage général d’un critère numérique pour la sélection de sites dépend cependant fortement de la connaissance des effectifs internationaux des populations d’oiseaux d’eau concernées. Cette connaissance procure la référence nécessaire à partir de laquelle le seuil de 1% est déterminé pour toute espèce ou population. La collecte de données de référence a lieu depuis longtemps dans le cadre du Comptage international des oiseaux d’eau de Wetlands International, en collaboration et parallèlement à d’autres plans de comptage nationaux ou internationaux et d’études spécialisées sur des taxons particuliers.
3. La révision des estimations internationales de populations a, jusqu’à ce jour, été principalement entreprise sur une base ad hoc, les dernières évaluations des échassiers et des anatidés du Paléarctique occidental ayant été présentées à la Conférence de Ramsar de 1987, à Regina. Il n’y a pas eu de calendrier déterminé officiellement au niveau international pour la révision des estimations de populations et des seuils de 1%.
4. Un petit atelier international a récemment été organisé afin d’étudier les activités en cours et les besoins futurs en matière d’estimation des effectifs internationaux des populations d’oiseaux d’eau dans le Paléarctique occidental et l’utilisation de ces données, notamment dans le cadre des obligations de la Convention de Ramsar.
5. L’atelier a examiné les mécanismes actuels de coordination des informations nécessaires pour évaluer les effectifs internationaux des populations d’oiseaux d’eau. La priorité a été donnée à l’identification des différents moyens d’utilisation de ces données et des besoins de base des différents groupes d’utilisateurs de données (par exemple, chercheurs, ONG nationales et internationales, organes de conservation nationaux, conventions et ministères). La réunion a fait des recommandations en ce qui concerne l’amélioration future des mécanismes actuels, notamment à la lumière de la Résolution 5.9 de Ramsar demandant que les estimations de populations d’oiseaux d’eau soient mises à jour tous les trois ans pour les sessions de la Conférence des Parties contractantes. Il a toutefois été noté qu’il ne fallait pas changer trop rapidement le seuil de 1% en réaction à des changements de populations mineurs: ce seuil devrait servir de référence à partir de laquelle évaluer l’importance de tel ou tel site.
6. L’atelier a recommandé d’entreprendre deux cycles de révision:
 - un cycle de révision triennal des estimations de populations des oiseaux d’eau du Paléarctique occidental (par exemple, pour chaque Conférence Ramsar); et
 - un cycle de révision de neuf ans du seuil de 1% pour les oiseaux d’eau du Paléarctique occidental (une réunion Ramsar sur trois) à moins que d’importants changements de populations n’aient lieu.
7. Pour comprendre ces évaluations, un modèle en deux étapes a été proposé:
 - premièrement, des études en rapport avec les taxons seront produites par les groupes de recherche de Wetlands International et les coordonnateurs de la Banque de données, entre autres, dans le cadre d’un plan d’action concerté; et

- deuxièmement, un rapport mondial résumé établi à partir de ces documents d'évaluation sera publié par Wetlands International.
8. Les participants à la réunion ont fait remarquer qu'il est très important mettre à disposition un seul ensemble de statistiques officielles, déterminées au niveau international, qui serait utilisé à la fois par la Convention de Ramsar et celle de Bonn ainsi que par d'autres traités internationaux. Wetlands International a un rôle important à jouer dans la coordination de l'élaboration de protocoles communs sur l'utilisation et la révision de ces données.
 9. L'atelier s'est concentré sur les questions concernant les estimations de populations d'oiseaux d'eau du Paléarctique occidental mais, tout au long, bien des points de la discussion se sont révélés applicables à d'autres régions du monde. Les participants ont recommandé la participation de représentants d'autres régions aux discussions futures.
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Informe Resumido de la Sesión Técnica E

“Criterios para la Identificación de Humedales de Importancia Internacional”

Presidente: Sr. Abdoulaye N'Daiye (Senegal)

Vicepresidente: Sr. Mihály Véghe (Hungría)

Secretaría: Dra. Montserrat Carbonell (Oficina de Ramsar)

Presentaciones principales

“La Importancia de los Peces y la Pesca en los Humedales: necesidad de un criterio Ramsar adicional para la designación de sitios de importancia internacional teniendo en cuenta los peces y la pesca,” Dr. Michael Bruton, Two Oceans Aquarium, Sudáfrica

“Necesidad de Dar Mayor Peso a Plantas e Invertebrados en los Actuales Criterios y Directrices de Ramsar,” Dr. Peter Bacon, University of the West Indies, Trinidad y Tabago

“Estimación de las Poblaciones Internacionales de Aves Acuáticas: la aplicación del criterio 3(c),” Dr. David Stroud, Comité Conjunto de Conservación de la Naturaleza del Reino Unido

El Presidente

1. indicó que el tema que iba a abordarse en la Sesión Técnica E y su resultado previsto eran tres proyectos de Resolución, a saber, las Resoluciones VI.2, VI.3 y VI.4.

El Vicepresidente

2. como miembro del Grupo de Examen Científico y Técnico, informó sobre la labor que se había realizado con otros expertos, de acuerdo con la Recomendación 5.9 de la Reunión de Kushiro de la Conferencia de las Partes, en relación con la propuesta de nuevos criterios para los peces y la pesca. También indicó que el GECT había examinado la necesidad de revisar los criterios existentes, pero no de cambiarlos.

El Dr. Bruton

3. detalló seis características que demostraban la importancia de los peces en los humedales (biodiversidad y biodisparidad, endemividad, situación de amenaza, productividad y rendimiento, funciones ecológicas y valor económico); explicó el proyecto de criterio 4 y definió sus términos. Se refirió a los cambios en los criterios propuestos por **Australia** y el **WWF**. concluyó que el criterio 4 aumentaría en gran medida la trascendencia de la Convención en el mundo en desarrollo y estimularía la investigación y la conservación de las poblaciones de peces, para beneficio de muchos, aunque las directrices debían utilizarse de un modo holístico, de acuerdo con el criterio de gestión de cuencas adoptado por la Convención. Dos países habían puesto a prueba los criterios propuestos con el resultado de que se habían identificado nuevos sitios, todos ellos costeros; los criterios también pusieron de relieve la importancia internacional de los sitios ya incluidos en la Lista.

El Dr. Bacon

4. dedicó su intervención a las plantas e invertebrados, pero señaló que no estaba preparado para proponer nuevos criterios relativos a estos grupos. Debía darse mayor importancia a las plantas de agua dulce y marítimas para identificar los humedales de importancia. Estas plantas podían incluirse dentro del criterio 1, pero había que resaltar sus características botánicas y en algunos casos su

singularidad. La inclusión de tipos de plantas en los criterios de identificación permitía la vigilancia de los humedales mediante controles remotos, lo que permitía disponer de un método más inmediato para valorar el estado de salud y conservación de los humedales. Las plantas podían servir también de indicadores de las condiciones del medio ambiente, especialmente las relacionadas con la hidrología. La presencia y las pautas de distribución de las plantas se podían utilizar para establecer una relación más directa entre los criterios Ramsar y los valores funcionales de los humedales. Los invertebrados de los humedales tienen una importante función ecológica (cadenas alimenticias, descomposición) y valores económicos. Su presencia y sus funciones pueden deducirse en gran medida estudiando la distribución de la vegetación en los humedales. Los actuales criterios 1 y 2, y el propuesto criterio 4, ofrecen una cobertura adecuada para los valores de los invertebrados en los humedales.

El Sr. Stroud

5. recomendó que se actualizaran cada tres años las estimaciones de las poblaciones internacionales de aves acuáticas, pero el umbral del 1% debía revisarse cada nueve años, permitiéndole de este modo actuar como criterio para medir la importancia de los sitios individuales.

Nueva Zelandia, Noruega, Suecia e Islandia

6. aprobaron la inclusión de los peces como criterio, pero manifestaron su preocupación ante la inclusión de la pesca en la propuesta de criterio 4(c). La formulación propuesta rebajaba el nivel de exigencia para incluir sitios en la Lista y daría paso a un número excesivo de designaciones nuevas. Preferían la expresión “poblaciones de peces”.

Australia

7. manifestó su deseo de que las definiciones de peces incluyeran a otras familias, por ejemplo, Thryamidas y Cyramidas.

El Reino Unido

8. manifestó una serie de preocupaciones ante la posible adopción de nuevas medidas que pudieran dar lugar a conflictos o superposiciones con normas nacionales y/o regionales ya existentes. Los peces y la pesca debían tenerse en cuenta a través de los términos del criterio 2 y las directrices relativas a los peces y la pesca debían desarrollarse a escala regional o nacional.

Intervenciones

9. **Italia, Trinidad y Tabago, el Consejo de Conservación de la Naturaleza de Nueva Gales del Sur** y el **Inland Rivers Network de Australia** propusieron unas pequeñas enmiendas al proyecto de Resolución VI.2, aunque en general sus intervenciones se mostraron favorables al mismo. **Sri Lanka** se mostró favorable a la incorporación de los peces, las plantas y las funciones hidrológicas, así como de la revisión de los criterios actuales para facilitar la identificación de humedales de importancia internacional de tipos que actualmente están infrarrepresentados. La **UICN** subrayó la necesidad de que se tuvieran en cuenta las funciones hidrológicas y señaló que estaba preparando una recomendación. **Chile** y **Ghana** opinaron que la inclusión de criterios relativos a los peces era positiva pero les preocupaba la falta de recursos financieros para obtener la información necesaria.

Francia

10. dijo que había puesto a prueba con éxito las directrices e identificado sitios importantes que si se hubieran aplicado los otros criterios no hubieran sido seleccionados. El uso de criterios relacionados

con los peces había ayudado a incorporar cuencas enteras, lo mismo que los criterios relacionados con las aves ayudaban a unir humedales en diferentes continentes a través de las vías migratorias.

Guinea-Bissau e Israel

11. apoyaron el proyecto de Resolución VI.2 e indicaron que esta Resolución ayudaría a identificar nuevos sitios y facilitaría la adhesión a la Convención.

Australia

12. apoyó el proyecto de Resolución VI.3 debido a su preocupación ante el número cada vez mayor de criterios y propuso que se considerara la posibilidad de unirlos todos.

El WWF

13. afirmó que debían tenerse en cuenta los pájaros dependientes ecológicamente de los humedales al identificar, designar o informar sobre humedales de importancia internacional.

Bélgica

14. señaló que, en su opinión, tras la adopción de criterios relacionados con los peces y la pesca, había llegado el momento de modificar la denominación de la Convención. La **República Eslovaca** mostró su apoyo a esta propuesta.

El Dr. Bruton

15. respondió a las preguntas que se le habían dirigido en las distintas intervenciones y afirmó que las directrices podían seguir siendo modificadas para hacerlas aplicables a escala regional y mundial. Se mostró de acuerdo con la utilización del término “poblaciones” en lugar de “pesca” en el criterio 4c).

El Dr. Bacon

16. refiriéndose a su intervención, se mostró de acuerdo con la opinión de Nueva Zelandia de que era importante utilizar las plantas como indicadores para designar sitios, especialmente en el caso de humedales efímeros. También se mostró de acuerdo con la preocupación de la República Eslovaca por la clasificación de los humedales por tipos y sugirió que en los criterios faltaba un planteamiento basado en ecosistemas.

El Presidente

17. pidió que se presentaran por escrito las propuestas para transmitir las al comité de redacción que se encargaría de volver a examinar los proyectos de Resolución VI.2 y VI.3. El comité estaría formado por Noruega, Nueva Zelandia, el Reino Unido, Trinidad y Tabago, Senegal, Sudáfrica, el Dr. Bruton, el Dr. Bacon y funcionarios de la Oficina. [Posteriormente Islandia sustituyó a Noruega.]

Resúmenes

“La Importancia de los Peces y la Pesca en los Humedales: Necesidad de un Criterio Ramsar Adicional para la Designación de Sitios de Importancia Internacional Teniendo en Cuenta los Peces y la Pesca” (resumen)

1. A pesar de que los peces son menos visibles y tienen menos capacidad de cautivar el interés público que las aves, es necesario que su importancia en los humedales sea más ampliamente reconocida. De los vertebrados relacionados con los humedales, los peces son los más abundantes y diversos. En el mundo hay más de 18.000 especies de peces que viven durante una parte al menos de su ciclo biológico en humedales en el sentido de la Convención de Ramsar. Los peces desempeñan una función ecológica esencial en el funcionamiento de esos humedales y en los ecosistemas a los que están vinculados. Muchos humedales de aguas dulces sustentan poblaciones endémicas de peces amenazadas, y los humedales costeros suelen contar con gran variedad de peces y sirven de zonas de desove, criaderos y/o fuentes de alimentos a poblaciones de peces marinos, muchos de los cuales tienen considerable importancia económica. Dado que los humedales de importancia como hábitat de aves acuáticas no tienen por qué ser forzosamente importantes como hábitat de peces, no cabe presumir que la conservación de humedales para las aves acuáticas lleve aparejada la conservación de poblaciones representativas de peces de humedales. En consecuencia, es menester que la Convención de Ramsar reconozca como importantes desde el punto de vista internacional a aquellos humedales cuya singularidad se deba a las características de sus poblaciones de peces y a la función que éstas desempeñan en el bienestar socioeconómico de las comunidades humanas de pescadores que dependen de ellos. Dado que ninguno de los criterios existentes atiende en un grado suficiente a las características de los peces y la pesca en los humedales, se propone, en unión de las directrices apropiadas, un cuarto criterio adicional para la designación de humedales de importancia internacional teniendo en cuenta esas características.
2. La adopción de este cuarto criterio permitirá designar humedales adicionales de importancia, sin mengua del valor de los actuales sitios Ramsar, sobre la base de criterios pertinentes a muchos países tropicales, subtropicales y de clima templado, especialmente en el caso de humedales que cuentan con importantes poblaciones de peces y con insignificantes comunidades de aves. El objetivo de este cuarto criterio es proteger la base ecológica de importantes comunidades de peces y actividades pesqueras, a fin de que éstas sigan siendo sostenibles a largo plazo, sin ninguna modificación de las condiciones ecológicas de los humedales, en consonancia con las directrices sobre uso racional y de forma que no afecte al derecho de las autoridades o comunidades locales a regular la pesca.

“Necesidad de Dar Mayor Peso a Plantas e Invertebrados en los Actuales Criterios y Directrices de Ramsar” (resumen)

Peter R Bacon, University of the West Indies, Trinidad y Tabago

1. Las plantas, y especialmente las diversas especies hidrófitas, constituyen la base de las cadenas tróficas de todos los humedales que sustentan aves acuáticas, peces y otros organismos. En las comunidades vegetales de los humedales, especialmente de marismas, manglares, prados de algas marinas y zonas forestales en llanuras aluviales, se dan algunos de los más altos niveles de producción primaria. Además, varias familias de hidrófitas sólo se encuentran en los humedales, y muchas plantas de floreción y especies de algas son más abundantes en esos hábitat. Los grandes marjales y marismas contienen frecuentemente una importante proporción de la variedad vegetal de una región, y las comunidades de algas asociadas a arrecifes y a zonas costeras de aguas poco profundas figuran entre las más variadas y productivas de los entornos bentónicos marinos. De los humedales se extrae una amplia gama de recursos vegetales para obtener combustible, alimentos, forraje, materiales de construcción, medicamentos, tintes y productos hortícolas que proporcionan medios de vida a un número considerable de personas, especialmente a nivel de subsistencia. De esta contribución directa de las plantas de humedales a las economías regionales, unida a su vinculación indirecta con la pesca a través de la cadena trófica, se infiere que hay que dar mayor peso a las plantas de agua dulce y marinas al formular criterios para identificar humedales de importancia internacional.
2. Aunque los actuales criterios 1 y 2 (no así el criterio 3, ni el propuesto criterio 4) tienen en cuenta en cierta medida a las plantas, es necesario un nuevo criterio que reconozca expresamente que éstas

constituyen un componente fundamental de los humedales. El criterio propuesto abarcaría los siguientes aspectos: variedad de plantas, carácter endémico, productividad, apoyo a la cadena trófica y valor económico.

3. Los invertebrados son una importante fuente de alimentación para las aves acuáticas, y tienen para muchas especies más importancia que los peces como organismos tróficos. Proporcionan además alimento, o apoyo a la cadena trófica que sustenta a muchas poblaciones de peces, anfibios, reptiles y mamíferos en hábitat de humedales de aguas dulces y marinos. Varios taxones invertebrados acuáticos se encuentran únicamente en hábitat de humedales, y el grado de endemismo es elevado en algunos de los sitios más aislados. Muchos invertebrados de humedales tienen un valor comercial inmediato, especialmente a nivel de subsistencia. Algunos organismos que constituyen valiosos recursos, como las ostras y los mejillones, sólo se encuentran prácticamente en humedales. De ello se deduce la utilidad que podría tener un criterio que reconociera la diversidad, la abundancia y el valor económico de los invertebrados al seleccionar humedales de importancia internacional.
4. No obstante, se considera que los actuales criterios 1 y 2 y el criterio 4 propuesto se ocupan de forma suficiente del valor de los invertebrados de humedales. En cambio, es preciso ampliar las notas explicativas y las definiciones que acompañan a esos criterios para hacer referencia expresa a la diversidad y valor económico de los invertebrados.

“Estimación de las Poblaciones Internacionales de Aves Acuáticas: la aplicación del criterio 3(c)” (resumen)

David Stroud, Comité Conjunto de Conservación de la Naturaleza del Reino Unido

1. El criterio del 1% (criterio 3c) se ha utilizado desde hace muchos años para identificar humedales de importancia internacional para sus poblaciones de aves acuáticas, y especialmente de humedales que deben ser incluidos en la lista de sitios conservados de la Convención de Ramsar. Con arreglo a ese criterio se identifican como sitios de importancia internacional aquellos en los que el 1% de las aves acuáticas de una determinada vía migratoria o población utiliza el humedal en cualquier momento de su ciclo anual. Este criterio, sencillo y aplicable a escala mundial, al que se han añadido últimamente otros, ha desempeñado un importante papel en la identificación e inclusión de sitios en la Lista en el marco de la Convención de Ramsar.
2. No obstante, la utilización general de este criterio cuantitativo en la selección de sitios depende esencialmente de la determinación del tamaño de las poblaciones internacionales de aves acuáticas de que se trate. Este dato es el elemento básico del que se deduce el umbral del 1% para cada especie o población. La recopilación de datos básicos a largo plazo se ha llevado a cabo por medio del censo internacional de aves acuáticas de Wetlands International, en conjunción con otros programas nacionales o internacionales de cómputo y con estudios sobre determinados taxones realizados por especialistas.
3. Hasta ahora la revisión de las estimaciones de las poblaciones internacionales se ha llevado a cabo caso por caso, y las últimas revisiones importantes relativas a las zancudas del Paleártico Occidental y a las ánades se presentaron a la reunión de Ramsar celebrada en 1987 en Regina. Antes de esa reunión no se había establecido ningún calendario convenido internacionalmente para la revisión de las estimaciones de población y de los umbrales del 1%.
4. Recientemente se organizó un pequeño taller internacional para examinar las actividades en curso y las necesidades futuras en la esfera de la estimación del tamaño de la población internacional de aves acuáticas en el Paleártico Occidental, así como la utilización de los datos correspondientes, especialmente en lo que respecta a las prescripciones de la Convención de Ramsar.
5. En primer lugar, se analizaron los mecanismos actuales de coordinación de la información necesaria para evaluar el tamaño de las poblaciones internacionales de aves acuáticas. El análisis se centró

especialmente en la identificación de los diversos usos de esos datos y en las necesidades básicas de los diversos grupos de usuarios de los datos (investigadores, ONG nacionales e internacionales, organismos oficiales de conservación, convenciones y ministerios). La reunión hizo recomendaciones encaminadas a la introducción de nuevas mejoras en los mecanismos actuales, a la luz especialmente de la Resolución 5.9 de Ramsar, con arreglo a la cual las estimaciones de la población internacional de aves acuáticas han de actualizarse cada tres años, coincidiendo con las reuniones de las Partes Contratantes. Se indicó, no obstante, que era importante que los umbrales del 1% no sufrieran modificaciones demasiado rápidas en función de cambios poco importantes del tamaño de la población, ya que deberían servir de “puntos de referencia” para evaluar la importancia de cada uno de los sitios.

6. El taller recomendó que se iniciaran dos ciclos de revisión:
 - un ciclo de tres años de revisión de las estimaciones de la población de aves acuáticas del Paleártico Occidental (cada reunión de la Conferencia de Ramsar); y
 - un ciclo de nueve años de revisión de los umbrales del 1% para las aves acuáticas del Paleártico Occidental (cada tres reuniones de la Conferencia de Ramsar), salvo que se produjeran cambios de población importantes.
 7. Para llevar a cabo esas revisiones se propuso un modelo escalonado en dos etapas:
 - en la primera, los grupos de investigación de Wetland International, los coordinadores de las bases de datos y otras personas elaborarán, conforme a un plan previo convenido, una serie de revisiones relacionadas con los taxones; y
 - en la segunda, Wetlands International publicará un informe resumido global basado en los documentos de las revisiones.
 8. La reunión destacó la gran importancia que tenía la posibilidad de contar con una serie convenida internacionalmente de niveles de población recogidos en informes oficiales para su utilización en el marco de la Convención de Ramsar, de los Convenios de Bonn y de otros tratados internacionales. Incumbe a Wetlands International una importante función en la coordinación del establecimiento de protocolos comunes sobre la utilización y revisión de esos datos.
 9. El taller se centró en las cuestiones relacionadas con las estimaciones de la población de aves acuáticas en el Paleártico Occidental, pero al ser muchos de los puntos objeto de debate pertinentes también a las demás partes del mundo, y el taller recomendó que en los futuros debates participaran también representantes de las demás regiones.
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PAPERS / EXPOSES / PRESENTACIONES

(in their original language only / dans la langue d'origine uniquement /
solo en el idioma original)

“The Importance of Fishes and Fisheries in Wetlands: the Need for an Additional Ramsar Criterion for the Designation of Sites of International Importance Based on their Fish and Fisheries”

Michael N. Bruton
Two Oceans Aquarium, Cape Town, South Africa

Three criteria have been defined by the Ramsar Convention for the identification of wetlands of international importance. Criterion 1 sets out the broad ecosystem characteristics of wetlands of international importance and places emphasis on the representativeness of different biogeographical regions. Criterion 2 emphasizes the importance of wetlands that support threatened plants and animals, conserve genetic diversity, provide habitat during critical life-history stages or are of special value to endemic plants and animals. Criterion 3 applies specifically to waterfowl. Waterfowl were selected for particular emphasis as they are important components of wetland ecosystems and because they are easy to quantify.

Wetlands of importance as waterfowl habitat may not be important as fish habitat, at least at the level of supporting threatened, endemic or ecologically important fishes as well as fisheries that add value to the wetland. It cannot be assumed, therefore, that the conservation of wetlands for waterfowl will necessarily ensure the conservation of wetlands that are important fish habitat. Many wetlands that are vital support systems for fishes, but which do not support high concentrations of waterfowl, may therefore not be perceived as high priority wetlands using the existing criteria.

In addition, it is recognized by the Ramsar Convention that wetland benefits include the provision of vital services to people, such as fisheries, potable water, watering for stock, building materials, etc. In particular, the importance of traditional rural fisheries that support subsistence communities, and the nursery function of wetlands, are not adequately covered by the existing criteria. It is therefore considered that a fourth criterion for the designation of wetlands based on their importance for fish and fisheries is required.

In this paper the importance of fishes in wetlands, and the importance of wetlands to fishes, are outlined and a draft fourth criterion for the designation of wetlands of international importance based on their fish and fisheries is proposed, on behalf of the Ramsar Steering Committee and the Scientific and Technical Review Panel.

What is a fish?

In the context of the draft fourth criterion, a “fish” is defined as any finfish, including jawless fishes (Agnatha, hagfishes and lampreys), cartilaginous fishes (Chondrichthyes, sharks, rays, skates and their allies) and bony fishes (Osteichthyes, most familiar fishes) (Table 1) as well as any shellfish that is part of the yield of a fishery (Tables 2 and 3). “Fishes” is used as the plural of “fish” when more than one species is involved.

Table 1: Fish orders that typically inhabit wetlands (as defined by the Ramsar Convention) and which are indicative of wetland benefits, values, productivity or diversity.

Jawless fishes - Agnatha

- hagfishes (Myxiniiformes)
- lampreys (Petromyzontiiformes)

Cartilaginous fishes - Chondrichthyes

- dogfishes, sharks and allies (Squaliformes)
- skates (Rajiformes)
- stingrays and allies (Myliobatiformes)

Bony fishes - Osteichthyes

- Australian lungfish (Ceratodontiformes)
- South American and African lungfishes (Lepidosireniformes)
- bichirs (Polypteriformes)
- sturgeons and allies (Acipenseriformes)
- gars (Lepisosteiformes)
- bowfins (Arniiformes)
- 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)
- halibeaks (Beloniformes)
- killifishes and allies (Cyprinodontiformes)
- sticklebacks and allies (Gasterosteiformes)
- pipefishes and allies (Syngnathiformes)
- cichlids, perches and allies (Perciformes)
- flatfishes (Pleuronectiformes)

Table 2: Shellfishes that are important components of the yields of fisheries of wetlands.

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

Table 3: Other aquatic invertebrates that are also components of the yields of fisheries of wetlands.

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

The importance of fishes in wetlands

The following six suites of characters demonstrate the importance of fishes in wetlands.

Biodiversity and biodisparity

Biodiversity has several components – the number of subspecies, species or families of fishes, the number of genetically distinct populations, the number of ecophenotypes or life-history styles, and the complexities of interactions between the above groups.

Fishes are the most abundant vertebrates in wetlands. Worldwide at least 18,000 species (28 orders) of fishes are resident for all or part of their life cycles in wetlands as defined by the Ramsar Convention. This figure may be as high as 21,458 species if all the 24,618 fish species known (Nelson 1994), except the deepsea fishes (2,900 species) and epipelagic fishes (260 species), are considered to live in wetlands.

The concept of “ecological species” also needs to be considered, i.e. the different ecological roles that individuals may play at different stages in their life cycles. This point is especially relevant to animals that have a marked metamorphosis in their life cycle, such as corals, barnacles, holometabolous aquatic insects (such as odonats and lepidopterans), amphibians altricial fishes with larvae or leptocephali (i.e. indirect development) and nidicolous birds (i.e. with naked young, such as passerines, some birds of prey and egrets). In all the above groups, the young are different “ecological species” from the adults.

The concepts of indicator, flagship and keystone species are also important. The presence of “indicator” species is a useful measure of good wetland quality. “Flagship” species have high symbolic value in the conservation movement, e.g. bald eagle, Siberian crane, flamingo, coelacanth, desert pupfish or sturgeon, whereas “keystone” species play vital ecological roles. The recognition of the important role of keystone species, which are often abundant and widespread, and the need for their conservation, deserves serious consideration even though it is foreign to the traditional conservation ethic, which is pre-occupied with rare species. Wetlands with significant proportions of indicator, flagship and/or keystone species should merit consideration as sites of international importance.

An important component of biodiversity is biodisparity, i.e. the range of morphologies and reproductive styles in a community (Jablonski 1994). 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 complex the physical and biotic environment, the greater the biodisparity of the fish fauna.

For example, Lake Malawi, a stable, ancient lake, is inhabited by only a few fish families (and therefore has a low biodisparity), but these families have radiated into over 600 fish species, of which 92% are maternal mouthbrooding cichlids. In contrast, the Okavango Swamps, a palustrine floodplain that fluctuates between wet and dry phases, has only 60 fish species but a wide variety of fish morphologies and reproductive styles and many fish families, and therefore has a greater biodisparity (Bruton & Merron 1990).

Measures of both biodiversity and biodisparity should be used to assess the international status of a wetland. A wetland with low biodiversity may have a high biodisparity and may be equally worthy of protection.

Diversity therefore includes diversity within species, between species and between ecosystems. Species counts alone are not necessarily a good measure of the diversity of the ichthyofauna of a particular wetland.

The problem of invasive aquatic animals also needs to be considered. Fishes (finfishes and shellfishes) have been widely distributed, accidentally or purposefully, by mankind from one catchment or continent to another, with sometimes disastrous consequences for the local fauna and ecology. In some cases, as in the Laurentian Great Lakes in North America, the indigenous fauna of the lakes has been dramatically altered, even though the total species count has not declined significantly. In Suisun Marsh in the Sacramento-San Joaquin estuary in the USA, the introduction of alien species has doubled the species count in the wetland (P. Moyle, personal communication, 1995). In other cases, as in Lake Victoria in Africa, alien species, combined with overfishing and pollution, have caused a major decline in the diversity of indigenous species. Measures of biodiversity and biodisparity should only take into account representative assemblages of indigenous species if the true intrinsic worth of the system is to be measured.

The situation is not, however, simple, as many high altitude lakes that formed since the last glaciation contain only introduced fish species. Throughout the world important commercial, recreational and subsistence fisheries are based on introduced species, especially trout, salmon, bass and tilapia. Furthermore, some alien species, for instance those used for biological control, have had beneficial effects on wetlands. In general, the introduction of fishes and shellfishes into water bodies in which they are not indigenous should be discouraged.

Endemicity

Implicit in the understanding of biodiversity is the importance of high levels of endemism. "Endemic species" are species that are unique to one region, often within one country or continent, and are found nowhere else. Many wetlands are characterized by the highly endemic nature of their fish faunas.

Some measure of the level of endemism should be used to distinguish sites of international importance. If at least 10% of the ichthyofauna is 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 Russia, Lake Titicaca in Peru/Bolivia, 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 intraspecific categories, such as geographical races, should be used.

Threatened status

At present 979 species of fishes are listed as threatened in the IUCN Red List, and at least 36 fish species and three subspecies are listed as recently extinct (since 1600 AD)(Groombridge 1993). These figures are probably gross underestimates of the actual situation and may mislead conservation authorities and resource users about the seriousness of the situation (Bruton 1995). It is widely considered that freshwater fishes are probably the most threatened group of vertebrates worldwide after the Amphibia.

Urgent action is needed to save many narrowly endemic, stenotypic wetland fish species from extinction, especially in Africa, Asia and South America. The extinction threat to the endemic cichlid fishes of Lake Victoria, where about 250 species may already have disappeared (Witte et al. 1992, Bruton 1995) is probably the biggest threat facing any vertebrate assemblage in the world. Anthropogenic pressures, especially habitat degradation, the introduction of invasive aquatic species, overfishing and pollution, are the main factors threatening inland and coastal fish species.

Fish conservation needs to be approached from a different perspective to the conservation of mammals, because of the high mobility of fishes and the continuous nature of many aquatic habitats, at least in the ocean and in large lakes and rivers. For this reason, fish conservation is more akin to that of birds, which share their mobility and continuity of habitat. In contrast, the fishes of smaller inland and coastal wetlands tend to be more insular.

While some stenotopic fishes could be conserved in isolation (but not for long), most fish (and bird) conservation involves the protection of habitats and biomes. This approach is also, of course, optimal for mammal conservation but, for practical reasons, most large mammals are not compatible with human uses of the biosphere, and they have to be confined to specific protected areas. From this perspective, fish conservation has good prospects, but this optimism is countered by the apathy that most humans have towards the protection of lower vertebrates and invertebrates. Furthermore, humans tend to be better at conserving compact habitats than elongate ones, like rivers, which cross varied biogeographical zones and inhabited areas (Bruton 1995). Island biogeography theory has furthermore demonstrated that compact reserves are more efficient than elongate ones. Ultimately, the conservation of wetland habitats is best achieved when it is related to the values and benefits that wetlands provide to humans. The Ramsar Convention is particularly well placed to contribute to this objective.

Productivity and yield

The yields of fisheries from inland and coastal wetlands are far greater than for any other vertebrate animal. Wetlands may have fish standing stocks in excess of 1000 kg/ha or more, but standing stocks are usually in the range 200-500 kg/ha. The sustainable yields of wetlands are also high, typically in the range 40-60 kg/ha/yr, but may be far higher (Welcomme 1979). Coastal wetlands yield not only finfishes but a wide variety of shellfishes as well. Fisheries products are used for direct human consumption but also to make stock feed, fertilizers, medicines and other products. The benefits of fisheries are not only financial – fisheries also promote socio-economic stability, stimulate subsidiary industries, encourage the sustainable management of aquatic resources and provide a healthy diet. In many rural communities the harvesting and processing of fishes incorporate many traditional rites that are part of the cultural diversity of these wetland communities.

The role of wetlands, especially estuaries and coastal marshlands, as nurseries for offshore fisheries and for fisheries in adjacent lakes or rivers is widely recognized (Welcomme 1979, Lowe-McConnell 1987, Bruton & Jackson 1988). The ability of wetlands to act as nurseries depends on the extent to which their natural cycles of inundation, water temperature fluctuation and nutrient pulses are retained. Welcomme (1979) showed that up to 92% of the variation in catch from a wetland-recruited fishery could be explained by the recent flood history of the wetland.

The natural cycles of wetlands vary greatly in amplitude and frequency, from the twice daily tides of coastal wetlands and estuaries to the annual and semi-annual floods of riverine or palustrine wetlands. In order to maintain the full productivity of wetlands, the flood regime that is specific to a particular wetland must be maintained.

Ecological roles

Fishes play a series of vital ecological roles in wetlands:

they convert resources at the base of the food chain into food for higher trophic levels they support predator populations of birds, mammals, reptiles, amphibians and invertebrates they act as a pathway for nutrients from aquatic to terrestrial biomes they unlock nutrients in the sediments through their bottom feeding and nesting activities they reverse the natural downstream flow of nutrients they transport nutrients from inshore to offshore areas they contribute to the detritus cycle through defecation and death they reduce macrophyte densities, especially in eutrophic wetlands they change the demography of prey populations they act as intermediary or final hosts to parasites.

Economic value

The economic value of fishes in wetlands is very high but very difficult to assess because of the dispersed nature of the fishery and the difficulty experienced in obtaining accurate statistics from all countries. FAO (1995 a & b) estimates that the value of the world's fisheries was about US \$ 179 billion p.a. in 1993 and that the value of fisheries from wetlands was worth about US \$9 billion in 1993. The world aquaculture yield (all from freshwater wetlands or coastal areas) was worth about US \$ 29 million in 1993.

Proposed fourth criterion based on fish and fisheries

Brief history

In 1993 presentations were made at the 5th Conference of the Contracting Parties (CoP5) in Kushiro on the importance of fish and fisheries in wetlands (by South Africa) and on the role of wetlands as nurseries for offshore fisheries (by The Netherlands). Recommendation C.5.9 from CoP5 instructed the Ramsar Bureau, in cooperation with the Contracting Parties, partner organizations and the STRP, to formulate proposals on criteria to be used when identifying wetlands on international importance as fish habitat and as a nursery for fisheries, and to develop guidelines for the application of these criteria.

At the first meeting of the STRP in Argentina in January 1994, two views were expressed on the way in which these new criteria could be drawn up. The first was that the existing criteria should be slightly

modified to accommodate fish criteria, and the second, that a fourth group of criteria should be drawn up specifically for fish and fisheries. After discussion it was agreed “that, as indicated in Montreux Recommendation 4.2, amendments to the criteria should as far as possible be avoided; however, some adaptations might be made to underline the importance of wetlands for fish. These might take the form of a new special criterion for fish or references in the guidelines to fish. It was further agreed that the Bureau should approach fish experts who had made presentations at Kushiro and other appropriate experts, with a view to preparing draft criteria or guidelines for the next STRP meeting”. M.N Bruton was subsequently invited as a Fish Expert to draft a fourth criterion based on fish and fisheries for the STRP.

A draft of the new fourth criterion and its guidelines was discussed at the second STRP meeting held in Hungary in September 1994. Revised drafts of the criterion and guidelines were tabled at STRP meetings held in France and Switzerland during 1994 and 1995, taking into account comments received from wetland scientists and managers from France, Switzerland, the USA., Australia, the UK and South Africa, and new information that had been brought to the attention of the STRP.

The final draft fourth criterion and guidelines were discussed and approved in principle (after further amendments) by the Standing Committee in September 1995 in Brisbane. The approved draft criterion and guidelines were then presented to the Conference of the Contracting Parties held in Brisbane in March 1996.

Proposed criterion 4

The proposed fourth criterion reads as follows:

“A wetland should be considered internationally important if:

- (a) 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 values; or*
- (b) it is an important source of food for fishes, spanning ground, nursery and/or migration path on which an offshore fishery or a fishery elsewhere in the catchment is dependent; or*
- (c) it is of special value in supporting a sustainable fishery on which a local community is dependent.”*

Discussion of subcriterion 4(a)

Draft subcriterion 4(a) reads as follows:

“A wetland should be considered internationally important if:

- (a) 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 values.”

Rationale: The importance of subcriterion 4(a) is that a wetland can be designated as internationally important if it has a high diversity of fishes and shellfishes even if it does not fulfill the requirements of the other criteria. Furthermore, this subcriterion emphasizes the different forms that diversity might take.

Definitions

Significant proportion: In polar biogeographical regions a “significant proportion” may be 3-8 species, families, life-history stages or species interactions, in temperate zones 15-20 species, families, etc. and in more tropical areas 40 or more species, families, etc., but these figures will vary between 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.

Indigenous species: A species that originates and occurs naturally in a particular place.

Endemic species: A species that is unique to one 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.

Species: Naturally occurring populations of fishes that interbreed, or are capable of interbreeding, in the wild.

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

Life-history stage: A stage in the development of a finfish or shellfish, e.g. eggs embryo, larva, leptocephalus, zoea, zooplankton stage, juvenile, adult, post-adult.

Species interaction: Exchanges of information or energy between species that are of particular interest or significance, e.g. symbioses, commensalisms, mutual resource defense, 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 richly developed in species-rich climax communities, such as coral reefs and ancient lakes, where they are an important component of biodiversity.

Populations: A group of fishes comprised of members of the same species. A wetland community would comprise all the species of plants and animals that live in that wetland.

Wetland benefits: The services that wetlands provide to people, e.g. water purification, supplies of potable water, fishes, plants, building materials and water for livestock, outdoor recreation and education.

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

Discussion of subcriterion 4(b)

Draft subcriterion 4(b) reads as follows:

“A wetland should be considered internationally important if:

(b) it is an important source of food for fishes, spawning ground, nursery and/or migration path on which an offshore fishery or a fishery elsewhere in the catchment is dependent.”

Rationale: Many fishes (including shellfishes) have complex life histories with the 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 stock is to be maintained. The productive, shallow habitats offered by coastal wetlands (including coastal lagoons, estuaries, salt marshes, 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 offsite fisheries, even if they do not necessarily harbour large adult fish populations themselves.

Furthermore, many fishes in rivers, swamps or lakes spawn in one part of the ecosystem but spend their adult lives in another inland water or in the sea. It is common for fishes in lakes to migrate up rivers to spawn, or 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. Some fishes are obligate spawners in wetlands; their presence would be of special significance in assessing the importance of that wetland.

The adoption of this subcriterion for the designation of wetlands of international importance is for guidance only and does not interfere with the rights of Contracting Parties to regulate coastal, offshore or offsite fisheries. The objective is to provide protection for the ecological basis of those fisheries so that they remain sustainable in the long term without changing the ecological character of the wetland, in accordance with the Wise Use Guidelines of the Convention.

Definitions

Spawning ground: That part of a wetland used by fishes for courting, mating, gamete release, gamete fertilization and/or the release of the fertilized eggs, e.g. in herring, shad, flounder, cockles, many fishes in freshwater wetlands. The spawning ground may be part of a river course, a stream bed, littoral 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.

Nursery: That part of a wetland used by fishes for providing shelter, oxygen and food for the early developmental stages of their young. In some fishes, e.g. nest-guarding tilapias, the parent/s remain at the nursery to protect the young, whereas in others the young are not protected by the parent/s except by virtue of the shelter provided by the habitat in which they are deposited, e.g. non-guarding catfishes.

The ability of wetlands to act as nurseries depends on the extent to which their natural cycles of inundation, tidal exchange, water temperature fluctuation and/or nutrient pulses are retained.

Migration path: The route along which fishes, such as salmon and eels, swim when moving to or from a spawning or feeding ground or nursery. Migration paths often cross international boundaries or boundaries between intranational management zones.

Fishery: An area in which there is an exploitable fish and/or shellfish resource that it is legal to harvest. In this context a “fishery” does not include an aquaculture or mariculture enterprise.

Offshore fishery: A fishery that takes place beyond the shore of a mainland in an adjacent sea, ocean or large lake that may be outside the wetland site.

Catchment: The area drained by a river and all its tributaries; a drainage basin or watershed.

Fishery elsewhere in the catchment: A fishery in the same river system as the wetland but further up- or downstream.

Discussion of subcriterion 4(c)

Draft subcriterion 4(c) reads as follows:

“A wetland should be considered internationally important if:

(c) it is of special value in supporting a sustainable fishery on which a local community is dependent.”

Rationale: The Wise Use Guidelines adopted by the Ramsar Convention encourage the sustainable utilization of wetlands in a way that is compatible with the maintenance of the natural properties of the ecosystem. “Sustainable utilization” is defined as “Human use [of a wetland] so that it may yield the greatest continuous benefit to present generations while maintaining its potential to meet the needs and aspirations of future generations” (Davis 1994, p. 135). The support of human communities by the wetland should therefore remain within the framework of sustainable use and habitat conservation, and should not change the ecological character of the wetland.

The underlying intention of this subcriterion is to recognize that, in certain cases, well-established subsistence fishing practices have become a part of the ecology of a wetland and add value to that wetland from the national and international perspective. Such wetlands may occur in developed or developing nations but are mainly found in the tropics where human dependence on the high natural biodiversity is greatest. The designation of such sites should secure the continued sustainable use of the wetland while also preserving the cultural component of the human-wetland link. This subcriterion should not be applied in such a way that the currency of Ramsar sites is devalued by leading to the designation of sites that are not of international importance.

Wetlands throughout the world support important subsistence fisheries on which communities of rural people are dependent for food, building materials, medicines, water and watering for their livestock. These subsistence fisheries are often carried out using traditional, handmade tackle, boats and processing equipment, and usually use the resource in a sustainable way. When modern synthetic materials, such as monofilament nylon, are introduced into subsistence fisheries their sustainability may be sharply reduced.

Subsistence fisheries may contribute significantly to the socio-economic well-being of a fishing community. In many cases, rural people are not able to harvest fish stocks further afield than their local wetland as they do not have adequate means of transport, preservation or refrigeration of the catches. The fishes caught in the wetland are usually consumed locally and are generally harvested in a sustainable way. Often the harvesting practices have become culturally important traditional rituals, the preservation of which is important. The entire livelihood of a community may depend on the ecological integrity of the wetland, which may in turn depend on the proper management of the upstream reaches of the river. The disruption of natural flood regimes in a river may interfere with fish breeding, feeding and migration patterns, and it is therefore important that catchments are managed holistically, with special attention being given to shared, transboundary wetlands.

Wetlands throughout the world make significant inputs to local economies. For instance, the 1989 yield of fishes from African freshwater wetlands amounted to 1,871,400 tonnes of which about 928,700 t (49.6%) was harvested from wetlands in countries that are Contracting Parties to the Ramsar Convention. The economic value of African wetland fisheries was estimated to be in excess of US \$1 billion in 1991 (Bruton & Merron 1994).

Wetlands also support extensive commercially important fisheries, e.g. cockle, mussel and oyster fisheries in many estuaries and coastal lagoons. These fisheries may be utilized without significantly changing the ecological character of the wetland and therefore its ability to carry out essential ecological processes.

The modern view of conservation is very different from that accepted at the time when the Ramsar Convention was originally promulgated. A central goal of conservation is to keep options open so that the widest diversity of appreciation and use of the natural environment can be accommodated in the long term. Conservation is now increasingly taken to include the cultural diversity of humans and their life styles. There is also a strong movement to recognize the importance of local communities, including indigenous peoples, and their dependence on wetlands. These changes in attitudes link cultural values and social issues to environmental management. While it is important that no radical departures should be made from the original Ramsar criteria, i.e. that sites are designated primarily on their ecological importance, it is important to remain in touch with new ideas on conservation and to recognize that the sustainable use of wetlands by traditional people has, in some cases, become an integral part of the ecology of those systems and has added value to them.

The adoption of this subcriterion for the designation of wetlands of international importance is for guidance only and does not interfere with the rights of local people to regulate a wetland fishery. The objective is to provide protection for the ecological basis of the fishery so that it remains sustainable in the long term without changing the ecological character of the wetland, in accordance with the Wise Use Guidelines of the Convention.

Definitions

Sustainable fishery: Harvesting of a fishery so that it yields continuous benefits to present generations while maintaining its potential to meet the needs of future generations.

Local community: A community of people that lives in the vicinity of a wetland and which obtains benefits from that wetland.

Conclusion

In the developing world, wetlands have an important role to play in the provision of renewable natural resources that are vital to the needs of rural people. The adoption of this new fourth criterion on the importance of fish and fisheries, which takes into account the Wise Use Guidelines so as to ensure that there is no negative impact on the wetland, is an important initiative that increases the relevance of the Ramsar Convention to developing countries. By concentrating on the protection of wetland habitats, the Ramsar Convention has the potential to make a significant contribution to improvements in the quality of life of rural people who depend on wetlands for food, water, fibres and building materials.

Although wetlands are typically resilient environments, they are vulnerable to interferences with their natural cycles of inundation, tidal exchange and/or nutrient flow. Attempts by people to interfere with these cycles usually have disastrous consequences. Wetland fish stocks, including the nursery stocks of young fishes, can usually be sustained on condition that near-natural ecological cycles are retained. In order to achieve this, it is essential that wetlands are managed holistically, i.e. including both the aquatic and the terrestrial phases, so that the amplitude of their natural cycles is retained. In addition, inocula (recolonizing life-history stages) of wetland plants and animals should be conserved during the dry-down so as to accelerate the recovery of the wetland after reflooding. Wetlands managed in this way contribute not only to local and offsite fisheries but also to the overall ecological functioning of catchment basins or coastal biomes. The holistic catchment management approach adopted by the Ramsar Convention is therefore very appropriate.

Acknowledgments

I am most grateful for the extensive assistance provided by Mike Smart, Montserrat Carbonell, Tom Kabii, Tim Jones and Satoshi Kobayashi of the Ramsar Bureau, to all the members of the Ramsar Standing Committee and the Scientific and Technical Review Panel, and to various independent fish experts, especially Christian Leveque, Glenn Merron, Alan Whitfield, Peter Moyle, Graham Donald and Steve Blaber for their valuable comments on earlier drafts of this paper.

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“The Need for Improving Coverage of Plants and Invertebrates in the Existing Ramsar Criteria and Guidelines”

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Plants, particularly the various hydrophyte species, are the basis of all wetland food chains that support waterfowl, fish and other organisms. Some of the highest levels of primary production occur in wetland plant communities, particularly marshes, mangroves, seagrass beds and floodplain forests. In addition, several families of hydrophytes occur only in wetlands and many flowering plant and algal species are most abundant in these habitats. Large swamps and marshes frequently contain a significant proportion of a region's plant diversity, while algal communities associated with reefs and shallow coastal areas are among the most diverse and productive in marine benthic environments. An extensive range of plant resources is extracted from wetlands, for fuel, food, fodder construction materials, medicines, dyes and horticulture, and these provide livelihood to considerable numbers of people, particularly at the subsistence level. This direct contribution of wetland plants to regional economies, but more importantly the indirect ecological linkages through food chains, including those that support fisheries, suggest that greater consideration should be paid to freshwater and marine plants in formulating criteria for distinguishing wetlands of international importance.

Although covered to some extent in existing Criteria 1 - 2, (but not in Criterion 3 or new Criterion 4), improvement to the existing Criteria may be required to give recognition to plants specifically as a fundamental component of wetlands. It is proposed the Criteria be improved to address: plant diversity, endemism, productivity, food-chain support; and possibly their economic value.

Invertebrates are a major food source for waterfowl, being more important than fish as food organisms for many species. They also provide food directly to, or are links in food chains which support, most fish, as well as amphibian, reptile and mammal populations in freshwater and marine wetland habitats. Several aquatic invertebrate taxa are restricted to wetland habitats and the level of endemism is high in some of the more specialised and isolated sites. Many wetland invertebrates are of direct commercial value, particularly at the subsistence level. Some resource organisms, such as oysters and mussels, are virtually confined to wetlands. This suggests that a Criterion recognising invertebrate diversity, abundance (and economic value) might be useful in selecting wetlands of international importance.

However, it is thought that existing Criteria 1 & 2, and proposed Criterion 4, could be upgraded to provide adequate coverage for wetland invertebrate values. In new Criterion 4, invertebrate species which are commercially exploited in a fishery are defined as “fish”. Although this has merit in resource evaluation, it serves to detract from the importance of invertebrates to ecological processes in wetland environments. It is proposed that explanatory notes and definitions accompanying all Criteria (the Guidelines) be expanded to make specific mention of invertebrate diversity and ecological value, in addition to their commercial value.

Coverage of wetland plants

Review of the scientific literature shows that none of the currently used classifications of wetland types is based on waterfowl, or other secondary producers, or on biodiversity. The two most commonly used descriptors appear to be:

- Physiographic character – used for broad scale description and hydrographic typing; and
- Vegetation community type – used for both broad scale and fine scale description (based on species dominance or composition) or sub-type designation.

For example, of the 110 types of wetlands listed by Lugo *et al* (1990), 61% were classified by vegetation type. Similarly, 53% of Dugan's (1990) 30 natural wetland sub-types were distinguished by their plant communities; and 35% of the 56 wetland and deepwater habitat classes in the USA reviewed by Cowardin *et al* (1992) were specifically defined by plant type or described as regularly dominated by particular plants. Most definitions of the term 'wetland' include some mention of plants adapted to inundated conditions.

An obvious advantage of making reference to wetland plants in the Ramsar Criteria is that it would permit harmonization between Ramsar and national site inventory work; such as the US National Inventory (Cowardin *et al*, 1992), which is probably the most advanced classification and inventory system in current use. It would also provide linkages to classifications of coastal wetlands (see for example, the general classification of Lugo & Snedaker, 1974; Bacon, 1993 for the Caribbean; Lacerda, 1993 for Latin America; Diop, 1993 for Africa) and to aquatic-terrestrial ecotone management activities (Naiman & Decamps, 1990).

The presence of certain types of wetland plant communities is indicative of high primary production, for example mangroves and seagrasses (Lugo & Snedaker, 1974). Acknowledging the importance of primary productivity to ecological and natural resource processes strengthens the case for wetland protection; at the national level as well as globally. Other values, such as the presence of exploitable plant products (Walsh, 1977), productive fisheries and commercially important wildlife follow from the productivity indicators. Furthermore, inclusion of plant type in selection criteria permits wetland monitoring by remote sensing. (This is rarely possible even for large populations of waterfowl, but never for fish). Plant growth, primary productivity and some aspects of phenology (flowering, fruiting, leaf-fall) can be measured and monitored remotely also; thus providing a much more sensitive method of gauging wetland health and status than assessments based on waterfowl or other faunal characteristics.

The presence of a plant type may serve also as an indicator of ambient environmental conditions, particularly as these relate to hydrology. For example, occurrence of mangroves is a likely indicator of a saline, tidal wetland environment. Plants are probably better indicators of wetland 'ecological character' than waterfowl.

Plant communities are the basis of many more wetland values than waterfowl or other animal resources; serving to provide exploitable goods and to function in sediment retention, nutrient and heavy metal uptake, the provision of roosting and nesting habitat, migration corridors and fish nurseries (the nursery value of wetlands depends largely on plant architectural/spatial structure and the composition of food chains based on plant production). Many wetlands are of ecological importance because of quantifiable export of organic materials (derived largely from plant detritus) to neighbouring ecosystems. The role of wetland plants in global oxygen and carbon budgets, and as carbon sinks, is of importance also. It should be stressed that the presence and distribution patterns of plants could be used to relate Ramsar Criteria more directly to wetland functional values.

Finally, because plant communities are non-motile, examination of hydrophyte distribution permits precise geographic delineation and description of wetlands. Certain plant species, or communities, are indicative of hydric soils, seasonal inundation or of ephemeral wetland location. The precise delineation of site boundaries is fundamental to all aspects of wetland management.

There are several representative wetland types which have plant communities characteristic of special life zones; for example, stromatolite-salinias and high alpine bogs. Some entire plant families are virtually restricted to wetlands; such as the Rhizophoraceae and Hydrocharitaceae. These can be accommodated under Criterion 1, but their botanical features, and in some cases their uniqueness, needs to be highlighted.

Plant diversity in wetlands is under-reported. Although coastal wetlands may be dominated by relatively few species in some regions (such as mangroves in the Caribbean), freshwater marshes and forested inland wetlands have rich floras and associated algae, bryophytes, mosses and ferns. Frequently inland wetland plant communities show high vegetation interspersation which increases ecotonal values. For example, plant species diversity in the Nariva Swamp, Trinidad, exceeds vertebrate diversity (319 species of flowering plants, at least 30 species of algae and 10 ferns, compared with 311 vertebrates of which 175 are birds). Twelve plant communities are recognised in the 60 km² swamp basin and these show a complex mosaic distribution which greatly diversifies the available habitats for the swamp fauna (Bacon *et al*, 1979). In some countries it is likely that a significant proportion of the total flora occurs in wetland habitats.

The degree of plant endemism in wetlands has received little attention, but the relative isolation of some inland wetland types suggests that it is likely to be considerable. The dependency of hydrophytes on aquatic habitat suggests that many species of wetland plants may be vulnerable or endangered through wetland loss and changes in hydrologic characteristics. Lowering of water tables, drainage, channelization and flood control impact directly on hydrophyte ecology. Coastal wetland plants are vulnerable also to impacts of sea level rise. It is likely that a large number of hydrophytes and related wetland plants is already in need of urgent conservation attention under the Ramsar Convention.

There are many gaps in the wetland vegetation database which need to be addressed before we can adequately appreciate the importance of plants in the selection of Ramsar Criteria.

Coverage of invertebrates

The original Ramsar Criteria for selection of wetlands of international importance were biased heavily towards a group of largely predatory vertebrates of limited ecological importance or economic value. The criteria paid scant attention to the habitat factors responsible for the presence of these waterfowl, or to the myriad associated biota, particularly the food organisms, on which they depended.

Wetland invertebrates fall into two categories: (a) components of the biodiversity, and (b) resource organisms.

Invertebrates are usually much more diverse and many times more abundant than vertebrates in both marine and freshwater wetlands (see for example, Hurlbert & Villalobos-Figueroa, 1982). They are an essential component of food webs which support waterfowl, fish and other vertebrates. Furthermore, several invertebrate taxa are found only in wetlands; including resource organisms such as shellfish. Resource organisms are covered to some extent by the proposed “fish” Criterion 4, where some aquatic invertebrates are included.

One limitation of including invertebrates only under the criterion dealing with fisheries, is the exclusion of the large number of arboreal invertebrates associated with wetland plants and the aerial insects with aquatic larvae (Bacon, *et al*, 1979). Among these are insects responsible for pollination of many swamp forest and marsh plant species on which wetland primary productivity depends. Their roles in the non-aquatic habitats within wetland complexes need further investigation.

Although it must be acknowledged that invertebrates have important ecological roles (food webs, decomposition) and economic values in wetlands their presence is secondary/dependent on other features, viz: hydrology and primary production. Their presence and roles can be inferred to a large extent by study of wetland physiography and vegetation distribution.

If the Ramsar Bureau definition is to continue to include coral reefs as wetlands (the implications of which appear not to be fully appreciated by the Bureau), the Criteria must reflect the fact that these ecosystems are built and dominated by invertebrates. Algae, fish and important commercial fisheries are associated with reefs, but these systems are unique in that they are the only known type which can be described as ‘invertebrate wetlands’.

Existing criteria, and the addition of Criterion 4, will adequately cover wetland invertebrates. Until such time as the biodiversity of wetland invertebrates has been adequately reviewed it would be inadvisable to attempt to use them for formulating additional criteria or guidelines.

It is hoped that these few comments will be of value in the future review of Ramsar Criteria.

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“Estimating International Waterbird Populations: Use Of Criterion 3(c)”

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The 1% criterion, Ramsar Criterion 3(c), has for many years been used to identify wetlands of international importance for their waterfowl populations, especially those which should be brought within the list of sites conserved under the Ramsar Convention (Atkinson-Willes *et al.* 1982).

The criterion identifies sites as of international importance if 1% of the waterfowl of a particular migratory flyway or population regularly make use of a wetland at any time during their annual cycle. This simple and globally applicable criterion, to which other criteria have more recently been added, has played a major rôle in the identification and listing of wetlands under the Ramsar Convention.

There is no fundamental biological reason to take 1% of a population as the threshold level for establishing international importance of a site. However, this percentage has been found by long experience and evaluation to be useful in giving an appropriate degree of protection to many populations except when widespread and dispersed, and in the definition of ecologically appropriate sites. The criterion has, therefore, gained worldwide acceptance.

The wide use of this numerical criterion in site selection depends crucially, however, on the establishment of the size of the international waterfowl populations concerned. This provides the necessary baseline from which the 1% threshold is derived for any species or population.

The long-term collection of baseline data has been undertaken through the International Waterfowl Census (IWC) of Wetlands International – itself working with and alongside other national and international counting schemes and specialist surveys for particular taxa.

The revision of international population estimates has, until now, been undertaken previously on an entirely *ad hoc* basis, with the last major reviews of waders and Anatidae being presented at the 1987 Ramsar meeting in Regina (Smit & Piersma 1989; Pirot *et al.* 1989). There has been no internationally agreed timetable for the revision of population estimates and 1% thresholds.

In using such a criterion, it is important that one internationally agreed set of officially reported population levels are used by the Ramsar and Bonn Conventions, and other international treaties, as well as other users such as national conservation agencies and non-governmental organizations.

Revision of international waterfowl population estimates

The report entitled *Waterfowl population estimates* was prepared by IWRB, AWB and WA for the 1993 Ramsar Conference. This brought together for the first time all data on waterfowl population estimates from all over the world (Rose & Scott 1994). The report suggested 1% thresholds for some populations, and where possible, indicated trends in the development of populations. It also updated population levels and 1% thresholds where these exist.

Following this publication, Wetlands International wished to consider in detail the future coordination and timetable for the preparation and revision of international waterfowl population estimates, involving strategic consideration of data collection, analysis and use by a variety of partner organizations and bodies. Technical workshops organized by Wetlands International in Denmark (1994), UK (1995) and France (1996) have considered the current and future development of this key area of conservation science, drawing on the expertise developed in northwestern Europe and especially in those countries with sophisticated systems for waterfowl monitoring and conservation delivery (Rose & Stroud 1994).

Common directions in international population estimation

The collation of data for *Waterfowl Population Estimates* highlighted a number of areas where review was necessary. This follows experience in some countries active in the designation of large numbers of Ramsar sites and their subsequent defence through complex legislative planning processes.

In some European countries (as well as other areas outside the Western Palearctic), the Ramsar designation gives an additional level of strict protection for a wetland over and above that provided by domestic legislation. In this regard, the designation attracts particular attention from those whose activities may be damaging to the site. There are often challenges to the designation, not only at the time it is made, but on a continuing basis. This may involve the legal defence of the site through courts, planning inquiries and other procedures. The consequence is that population estimates used in site selection must be defensible to the greatest degree possible, and their derivation must have involved high scientific standards.

In other parts of the world, lack of adequate domestic legislation places a heavy reliance on site protection through international designations such as Ramsar listing. In some areas, the quality and quantity of data may be such that only “best estimates” are available for some waterfowl populations. Even these data are crucial throughout much of the world for providing a basis for flyway site safeguards and for driving nature conservation forward.

The workshops considered the development and use of population data specifically as related to the Western Palearctic region. It was noted that although many of the issues related to data were especially acute in NW Europe (from where workshop participants came), population estimation had to relate to appropriate biogeographical units – in this case the Western Palearctic or East Atlantic Flyway. It was also noted that issues involved were often common throughout the world and there would be benefits for other regions in undertaking similar review exercises.

The challenge faced in deriving one global report is to ensure that both situations with a well developed information base and those areas where detailed or extensive counts are not available can be catered for, bearing in mind that the current experience of the former situation may be useful in guiding the development and growth of counting in the latter.

Data collection and collation

The workshops addressed the processes involved in waterfowl population estimation in the Western Palearctic, especially with regard to the uses and users of the information generated. The structures for current collection of data on waterfowl population size were reviewed, as well as the adequacy of present collection procedures. Particular attention was given to seabirds, as some of these species are now classified as waterbirds. It was noted that the principal population census was through breeding season census, especially of colonial species, and that there are currently only weak structures for the regular collation of such data at an international level. Such coordination structures for seabirds need urgently to be developed.

Most data for most non-breeding waterfowl are collated through the International Waterfowl Census. There is sometimes interpretation of this information by Wetlands International’s Specialist Groups (*e.g.* for seaducks, geese and waders).

Regularity of revision of totals

Ramsar Resolution 5.9 of the 1993 Kushiro meeting requested Wetlands International to update population figures used to derive 1% thresholds on a three-year cycle in line with meetings of the Contracting Parties.

Concerns have since widely been expressed that full revision of international 1% thresholds every three years is too frequent. The value of 1% thresholds is that they provide a medium term, consistent base-line against which to evaluate sites in an international context. If they change too frequently, this stability is lost and no sooner have one set of criteria been produced, and disseminated through governmental systems to a local

level, than another revision is due. This could cause considerable practical problems in many countries, for example, with the constant need to revise national lists of “shadow” Ramsar sites (those qualifying as of international importance), as populations alter in size through the short-term effects of natural changes in productivity and mortality.

Many waterfowl undergo substantial natural year-to-year population change, owing to variations in breeding success and/or winter survival. A too-frequent revision of 1% thresholds is especially a problem for these populations since changed 1% thresholds may only reflect short-term natural variation rather than real population change.

There is generally an inverse relationship between frequency of population revision and geographical scale. At the level of the individual site, at least annual, if not more frequent, assessments are necessary in order to fine-tune site management. At national and international levels, the currency used by conservation practitioners (the population estimate) needs to change *less* frequently to be most useful. At national level, we probably need to review populations about every 3-5 years, and at the scale of the international population estimate and for 1% thresholds, a frequency of change in the order of nine years has previously been established practice and is now suggested for the future.

This is obviously something for the Ramsar Parties to consider and decide upon, but the workshops considered it desirable in future revisions of the report to update international *population levels* (where necessary or appropriate) every three years, but to aim to avoid changing *1% thresholds* on this timetable unless there has been a change of significant magnitude (*c.*20% was suggested but guidelines have yet to be developed) to make this likely to be a real change and thus really necessary.

The process thus has two separate elements:

- the desirable frequency of revision of “true” population totals; and
- the desirable frequency of revision of 1% thresholds (*i.e.* the nominal totals which may vary slightly from time to time from the true total population).

This in turn led to a consideration of the *use* of these two elements by a variety of parties. There are a number of potential user-groups, including:

- international conservation agencies (*e.g.* Wetlands International, BirdLife International, IUCN *etc.*);
- Convention and international bureaux (*e.g.* Ramsar Bureau, Bonn Convention Secretariat, European Commission, *etc.*);
- academics and specialist research groups (*e.g.* the International Wader Study Group);
- government ministries responsible for the designation and protection of sites and species; and
- governmental and non-governmental conservation bodies involved in the identification of sites and their management for species.

Different users have different needs from the population totals. The system of revision must be flexible enough to satisfy most users most of the time (recognizing that it may not be possible to please all users, all of the time!).

For conservation scientists, knowledge of annual year-on-year population changes is important to monitor the health of populations (and to give data for modelling *etc.*). For advising governments and conservation practitioners, there is no need for a full new set of published international population levels to be made each year.

Timetabling and planning of future population revisions

The meetings agreed a parallel programme of scientific dissemination of population estimates (detailed taxa reviews *e.g.* for geese, waders, seaducks) slightly ahead of the timetable for the global summary report. These reviews will be published *in advance* of their use in a global summary.

Such dual dissemination (review papers and global report) would not only show how data were derived (the review papers for particular taxa), but at the same time give a global vehicle for presenting “best-estimate” information where these are the only sources (much of the world). Such forward planning is important so as to integrate with other groups (*e.g.* those concerned with seabirds) for maximum effectiveness.

The result is a system which gives a scientifically sound international benchmark, especially inasmuch as this ensures that all international data ultimately used to underpin site selection at a national level are clear, published and open to critical inspection by third parties.

A key stage of the process is the circulation of draft revisions of *Waterfowl Population Estimates* to Contracting Parties in advance of each Conference. This will allow sufficient time to assess changes and endorse them at the Conference. Drafts should be circulated with Conference papers (as recommended by the 1995 Pan-European Ramsar meeting in Varna).

Conclusions: mechanisms for future revisions of international waterbird population levels

Objective

To prepare one agreed, and recognized, source of information in the world, documenting waterbird population levels to a regular reporting timetable, whilst accommodating to the greatest extent possible the requirements of international conservation bureaux, and governmental and non-governmental users.

Table

Two cycles of review are appropriate:

- a three-year cycle of revision of population estimates for Western Palearctic waterfowl (*i.e.* for every Ramsar Conference);
- a nine-year cycle of revision of 1% thresholds for Western Palearctic waterfowl (every third Ramsar meeting), unless there has been a change of significant magnitude (*c.* 20%, guidelines to be agreed) within a three-year period. (The separation of revision of population estimates from 1% thresholds and their use in applying the 1% criterion is important to avoid rapid changes of lists of qualifying sites consequential on short-term population changes.)
- A timetable for the next decade has been agreed by Wetlands International (Table 1).

Format

In undertaking these reviews, a two-stage model was suggested:

- first, published taxa-related reviews (produced to an agreed forward plan - Table 1); and
- secondly, a global summary report drawing on review papers (produced by Wetlands International for the Ramsar Convention).

Published global summary reports on waterfowl population levels should have the following format:

- All primary estimates will be directly sourced or have a clear audit trail.
- Wherever possible, estimates will be derived from published or other reviewed data -- *not* taken direct from databases (*i.e.* databases help to form the basis of the taxa-related reviews).
- It would be useful for future *Waterfowl Population Estimates* to include maps showing the geographic extent of estimates.

Process

- Revision of the global report will be undertaken every three years for meetings of Ramsar Contracting Parties.

- The revised *Waterfowl Population Estimates* report will be circulated in draft with the Conference papers in advance of each Ramsar Convention meeting. This will allow sufficient time for Contracting Parties to consider proposed changes and endorse them at each meeting.
- Official 1% thresholds for the Western Palearctic species in the global report will normally be updated every nine years, although with “emergency” revision of 1% thresholds possible at three-yearly intervals if rapid changes of population occur (*i.e.* population levels are changed every three years, but 1% thresholds are changed only every nine years unless they change by greater than a specific magnitude - as defined by Wetlands International’s Specialist Groups).
- There will be no changes of “official” international population levels or 1% thresholds within three-year periods except in an emergency.

Acknowledgements

Financial support for workshops were provided by the UK Joint Nature Conservation Committee, the Danish National Environmental Research Institute at Kalø, and Office National de la Chasse, France. Arrangements and organization was undertaken by IWRB/Wetlands International. Workshops were attended by Vincent van den Berk (National Reference Centre for nature Conservation, The Netherlands), Nick Davidson (WSG/IWRB liaison), Bart Ebbing (IBN-DLO, The Netherlands), Tony Fox (Danish National Environmental Research Institute - NERI), Colin Galbraith (JNCC), Barbara Ganter (IBN-DLO, The Netherlands), Karsten Laursen (NERI: IWRB Seaducks Research Group), Jesper Madsen (NERI: IWRB Goose Research Group), Pieter Musil (Czech Republic), Stefan Pihl (NERI: IWRB goose and seaducks databases), Marc van Roomen (SOVON), Paul Rose (IWRB), Saulius Svazas (Lithuanian Inst.Ecology), Derek Scott (IWRB consultant), David Stroud (JNCC), Cor Smit (IWRB wader database), Mark Tasker (JNCC/Seabird Group), Val Taylor (IWRB), Jacques Trouvilliez (ONC, France) and Janine van Vessem (IWRB). Although unfortunately not able to be present, Birdlife International (Colin Bibby, Melanie Heath, Graham Tucker and Zoltan Waliczky), and the Ramsar Bureau (Mike Smart) sent written submissions which were considered and aided deliberations.

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Table 1. Forward plan of activity relating to international estimation of waterfowl population levels, and reporting to Ramsar Convention.

Year	Activity for Ramsar Convention and Ramsar Bureau	Actions for individual countries	Action for IWRB, its Research Groups, database co-ordinators, and others	Action for IWRB HQ (with AWB & WA)
1994			Full taxa reviews for Western Palearctic prepared by IWRB Research Groups	Kushiro report published.
1995	September/October: circulate draft global report to Contracting Parties as Conference paper	Provide advice and data as required. Meeting of Steering Group - summer/early autumn 1995	Full taxa reviews finalised: deadline for submission to IWRB HQ - May 1995	May-August: prepare second global report and transmit to Ramsar Bureau in September (for Western Palearctic: first full nine-yearly review of population levels and 1% thresholds)
1996	March: endorse global report at 6 th Ramsar meeting and disseminate "official" 1% levels	Implement revised 1% thresholds in selection of Ramsar sites for all species		
1997		Provide advice and data as required	Limited taxa reviews for Western Palearctic prepared	
1998			Taxa updates finalized and published	Prepare third global report and transmit to Ramsar Bureau (for Western Palearctic: only population levels changed)
1999	Circulate draft global report to Contracting Parties as Conference paper Endorse global report at 7 th Ramsar meeting and disseminate "official" 1% levels	Implement any revised 1% thresholds in the selection of Ramsar sites		
2000		Provide advice and data as required	Limited taxa reviews for Western Palearctic prepared	

2002-3		Ensure coordination of adequate species/geographic coverage e.g. single species surveys, seabird surveys, seabird colony counts, rocky shore counts etc.	Coordination of period for major survey work to ensure complete international coverage of flyway populations for the Research Group reviews (e.g. expeditions to Western Sahara for waders), and also occasional extensive surveys (e.g. some seabird studies/rocky shorebird counts etc.)	
2003			Full taxa reviews for Western Palearctic prepared by IWRB Research Groups	

Year	Activity for Ramsar Convention and Ramsar Bureau	Actions for individual countries	Action for IWRB, its Research Groups, database co-ordinators, and others	Action for IWRB HQ (with AWB & WA)
2004		Provide advice and data as required	Full taxa reviews finalised and published	Prepare fifth global report and transmit to Ramsar Bureau (for Western Palearctic: second full nine-yearly review of population levels and 1% thresholds)
2005	Circulate draft global report to Contracting Parties as Conference paper Endorse global report at 9th Ramsar meeting and disseminate 'official' 1% levels	Implement revised 1% thresholds in selection of Ramsar sites for all species		
2001			Taxa updates finalised and published	Prepare fourth global report and transmit to Ramsar Bureau (for Western Palearctic: only population levels changed)

2002	Circulate draft global report to Contracting Parties as Conference paper Endorse global report at 8th Ramsar meeting and disseminate 'official' 1% levels	Implement any revised 1% thresholds in selection of Ramsar sites		
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