Wetland Management Planning

A Guide for Site Managers

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2008

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WWF

WWF is one of the world's largest and most experienced independent conservation organizations, with almost 5 million supporters and a global network active in more than 100 countries.

Wetlands International

Wetlands International is the only global NGO dedicated to the conservation and wise use of wetlands. It works globally, regionally and nationally to achieve the conservation and wise use of wetlands, to benefit biodiversity and human well-being.

IUCN

The World Conservation Union is the world's largest and most important conservation network. The Union brings together 83 States, 110 government agencies, more than 800 non-governmental organizations (NGOs), and some 10,000 scientists and experts from 181 countries in a unique worldwide partnership.

Ramsar Convention

The Convention on Wetlands, signed in Ramsar, Iran, in 1971, is an intergovernmental treaty which provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. There are presently 158 Contracting Parties to the Convention, with 1718 wetland sites, totaling 159 million hectares, designated for inclusion in the Ramsar List of Wetlands of International Importance.

WWF- Canon / Roger LeGuen

Water lilies in the Kaw-Roura Nature Reserve. These wetlands have been declared a nature reserve in 1998, and they cover an area of 100,000 hectares. Kaw-Roura is also a Ramsar site. French Guiana (FR).

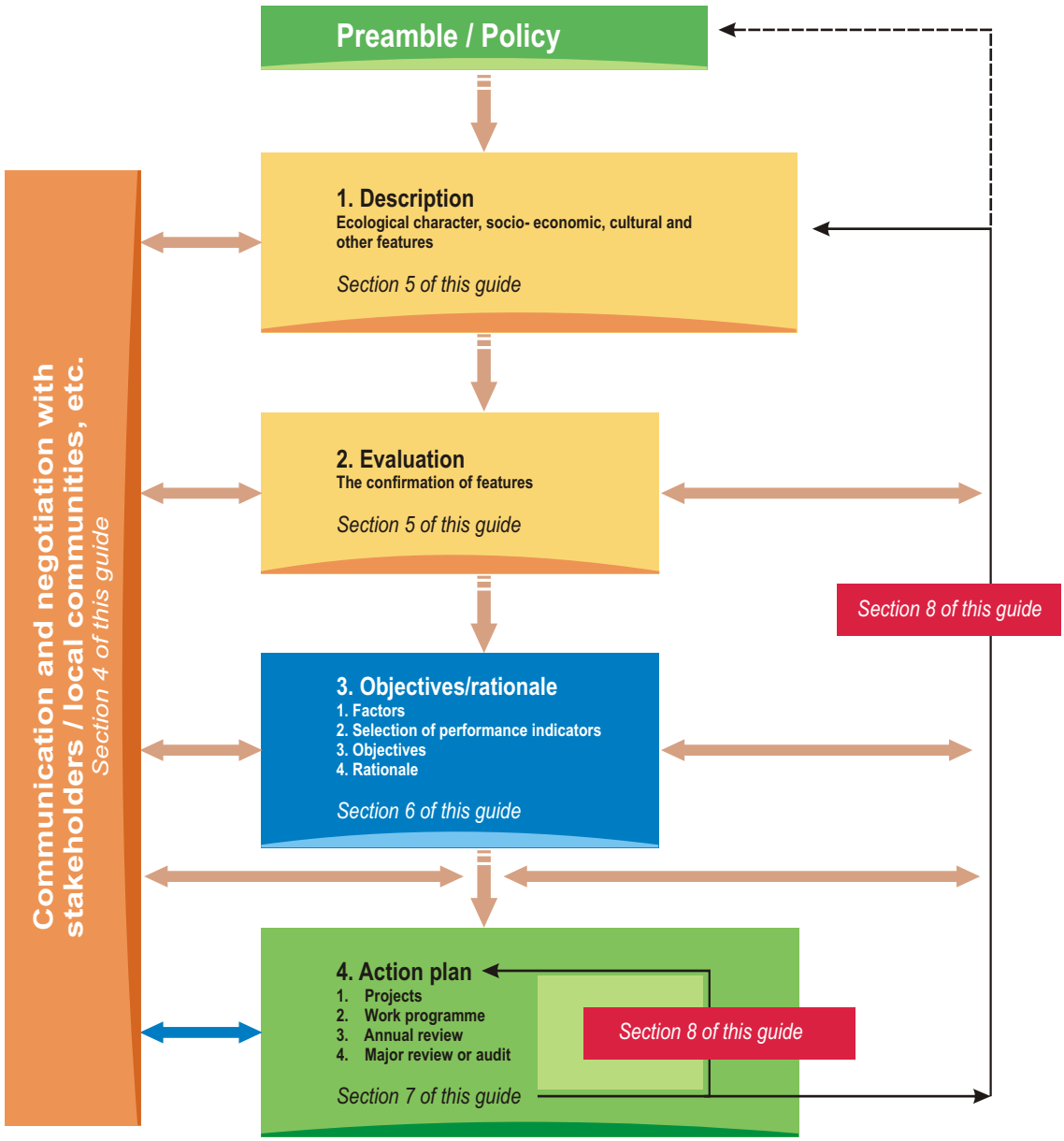
Contents

Overview of the overall wetland management planning process

The colour - coded steps in the process are cross-referenced to the relevant sections of this guide

WWF - India / Pankaj Chandan

Grasslands near Tsokar, a high altitude wetland in Tibetan Plateau, Ladakh. These wetlands represent important breeding sites for a number of migratory birds including the highly endangered Black-necked Crane (*Grus nigricollis*). Jammu & Kashmir, India


Preamble / Policy
1. Description
Ecological character, socio- economic, cultural and other features
Section 5 of this guide
2. Evaluation
The confirmation of features
Section 5 of this guide
3. Objectives/rationale
1. Factors
2. Selection of performance indicators
3. Objectives
4. Rationale
Section 6 of this guide
4. Action plan
1. Projects
2. Work programme
3. Annual review
4. Major review or audit
Section 7 of this guide
Section 8 of this guide
Section 8 of this guide
Communication and negotiation with stakeholders / local communities, etc.
Section 4 of this guide

1. Introduction

This guide is intended to provide a summary of the steps to develop wetland management planning processes. Improved understanding of how to use these principles and planning steps will help achieve more effective conservation and thus wetland wise use.

This summary guide has been prepared to help managers of sites listed under the Ramsar Convention on wetlands as well as all other types of wetlands. It provides a summary of Ramsar's Handbook 16 Managing wetlands : Frameworks for managing Wetlands of International Importance and other Wetland sites, 3rd edition, 2007, while highlighting other relevant sources of useful information on wetland management planning.

The Ramsar Handbook series can be downloaded in PDF format from **http://www.ramsar.org/lib/lib_handbooks2006_e.htm** or can be obtained on CD-ROM from the Ramsar Secretariat (ramsar@ramsar.org).

WWF - India / Parikshit Gautam

Lake Tsomgo, a high altitude wetland in eastern Himalayas. WWF is working to strengthen local community organization for regulating intense tourism activities threatening this wetland. Sikkim, India

WWF - Canon / Martin Harvey

Aerial view of islands and waterways of central Okovango wilderness, Okovango Delta, Botswana.

Where to find further information

Ramsar's Handbook for the wise use of wetlands, 2007. Managing wetlands : Frameworks for managing Wetlands of International Importance and other Wetland sites, 3rd edition, Vol. 16, Ramsar Convention Secretariat, Gland, Switzerland **http://www.ramsar.org/lib/lib_handbooks2006_e16.pdf**

Thomas, L. & Middleton, J. 2003. Guidelines for Management Planning of Protected Areas. World Commission on Protected Areas, Best Practice Protected Area Guidelines Series No. 10. IUCN, Switzerland.

EU Life Programme, 2004. Reviving wetlands - Sustainable management of wetlands and shallow lakes. **http://www.livingwetlands.org/index.php?navig=public/navig.php&cont=public/cont.php**

Eurosite, 1999. Eurosite Management planning toolkit. **http://www.eurosite-nature.org/article.php3?id_article=77**

For Glossary of Wetland Terms : **http://www.medwet.org/medwetnew/en/TEXTS/GLOSSARIO.xls**

2. The need for management planning

Wetlands are valuable ecosystems occupying about 6% of the world's land surface. They include a wide spectrum of habitats ranging from extensive peat bogs in northern latitudes to tropical mangrove forests, from seasonal ponds and marshes to floodplains and permanent riparian swamps, from freshwater shallow lakes and margins of large reservoirs to the salt lakes, brackish lagoons, estuaries and coastal salt marshes. Extensive seagrass beds along coasts and coral reefs are also wetlands. Thus, wetlands show great differences in their habitat characteristics, hydrological regimes, water quality and soils, and in the nature and diversity of their biota.

Wetlands are dynamic areas, influenced by both natural and human factors. In order to maintain their biological diversity and productivity, and to permit the wise use of their resources, there is an urgent need to conserve them through well focussed management actions.

For management to be effective, the following information is needed:

- an understanding of the habitats and species occurring;
- how these interact to form ecosystems;
- the natural processes that sustain them; and
- threats to these processes.

In particular, management must understand past and present human usage, its current or future impact, and the means by which optimum (sustainable) usage can be achieved. Effective management, therefore, means understanding the full spectrum of measures and actions necessary to sustain the site. It also has to place the site positively within the community context and be able to respond to any potentially threatening development that may take place in the surrounding area.

"A management plan is a written, circulated and approved document which describes a site or area and the problems and opportunities for management of its nature conservation, land form or landscape features, enabling objectives based on this information to be met through relevant work over a stated period of time".

Source: Eurosite Management Planning Toolkit, 1999

To achieve these things effectively, a common understanding, and sometimes an agreement, is needed between the various managers, owners, occupiers and others whose activities link to, or are affected by the wetland. The management planning process provides the mechanism to achieve this understanding and agreement. It is also fundamentally a process designed to increase the awareness of all the people or organizations involved with the site and thus enhance a collective commitment to act together to conserve the wetland.

Neighbours and local people should be actively involved in this process. There are essentially two products that come from a good planning process; the plan itself, but usually more importantly, stakeholder empowerment and engagement in informed, strategic, management actions.

Ten reasons to prepare a wetland management plan

1 To identify the objectives of site management
It is vital to define clearly site management objectives in order to develop an effective management plan. The values of the site, and management objectives, will help set realistic goals so as to provide a sense of direction, focus and a guide for the actions needed. They will be the yardstick by which success can be measured.

2 To identify what factors affect, or may affect, your site's key features
The management planning process helps to identify those factors which may affect the site, and thus its ecological, social, cultural and economic values. This helps to set practical objectives.

3 To resolve conflicts
The planning process provides a platform for resolving existing or potential conflicts between those people or organisations with an interest in the site, and helps create positive attitudes, thus establishing commitments towards future initiatives.

4 To identify and describe those actions required to achieve management objectives
As part of the planning process, the management actions required for safeguarding critical habitats, species or vital ecosystem services and with meeting the needs of site users will be identified and described.

5 To define the monitoring requirements
The planning process also helps identify those factors, which if monitored, will give early warning of undesirable changes to the site and thus help measure management effectiveness.

6 To maintain continuity of effective management
Effective management and monitoring require continuity of purpose. Management may change, processes may be adapted to meet a wide range of factors, but as long as the purpose of management remains constant, it should remain effective.

7 To help obtain financial resources
Management planning helps wetland managers to identify and quantify the financial resources required to manage the site as well as to identify opportunities for generating income to support management processes. Detailed budget preparation is essential prior to seeking funding. Shortfalls in management capacity, such as staff, equipment or other resources, can be identified and budgeted for in the plan to help with fund-raising.

8 To enable communication within and between sites, organizations and stakeholders
Management planning processes provide an important means of involvement and communication with the site's stakeholders. Planning also helps managers take quicker and better decisions by presenting information in a logically, well-structured manner. It can also aid communication with other agencies to aid collaboration and is a practical means of sharing information about wetlands and thus helping comparisons with other sites.

9 To demonstrate that management is effective and efficient

The management plan serves as the baseline against which performance is assessed. Assessing outputs against the plan should enable you to demonstrate conservation and wise use of resources to the local community, governments and funding bodies.

10 To ensure compliance with local, national and international policies

Management planning helps:

- provide wider context for local decisions on management planning;
- link local actions with wider (national and international) wetland policies;
- contribute to the national implementation of the Ramsar Convention; and
- support national biodiversity Action Plans and strategies.

See the *Case Studies 1 & 2* for further information about management planning in practice.

WWF - Canon / Edward Parker

Signs on entrance to one of the managed fish-breeding lakes, near Silves. Community Ecotourism and Floodplain Resources Management in Silves, is part of one of the WWF Freshwater projects sponsored by HSBC. Amazonas, Brazil.

WWF - Canon / Rob Buiter

Danau (Lake) Sentarum National Park. It is one of the most unique wetlands in Asia, marked by outstanding biodiversity. This area was declared as a National Park in 1999, covering 132,000 hectares. The park is located in the Kapuas Hulu District, which declared itself a Conservation District in 2003. West Kalimantan, Indonesia.

3. Essentials of management planning

Management planning is a process

A plan defines objectives at a specific point in time, but good planning requires continuous monitoring and evaluation to assess its effectiveness. Regular review gives feedback on the effectiveness of management actions and thus enables fine-tuning of the plan, or, if necessary, more fundamental revision.

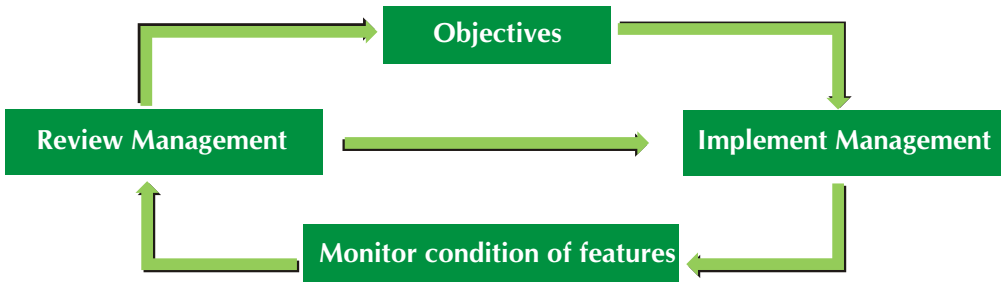


Fig. 1. The adaptive management cycle.

Source: Managing wetlands. Ramsar Handbook No. 16, 3rd edition, 2007.

Adaptive management approach

This approach enables wetland managers to:

- learn through experience ('learning by doing');
- take account of, and respond to, changing factors that affect the features of the site;
- continually develop or refine management processes; and
- demonstrate that management is appropriate and effective.

The cycle is usually repeated at regular or predetermined intervals, or at any time when emergencies or unforeseen threats become apparent.

Source: Managing wetlands. Ramsar Handbook No. 16, 3rd edition, 2007.

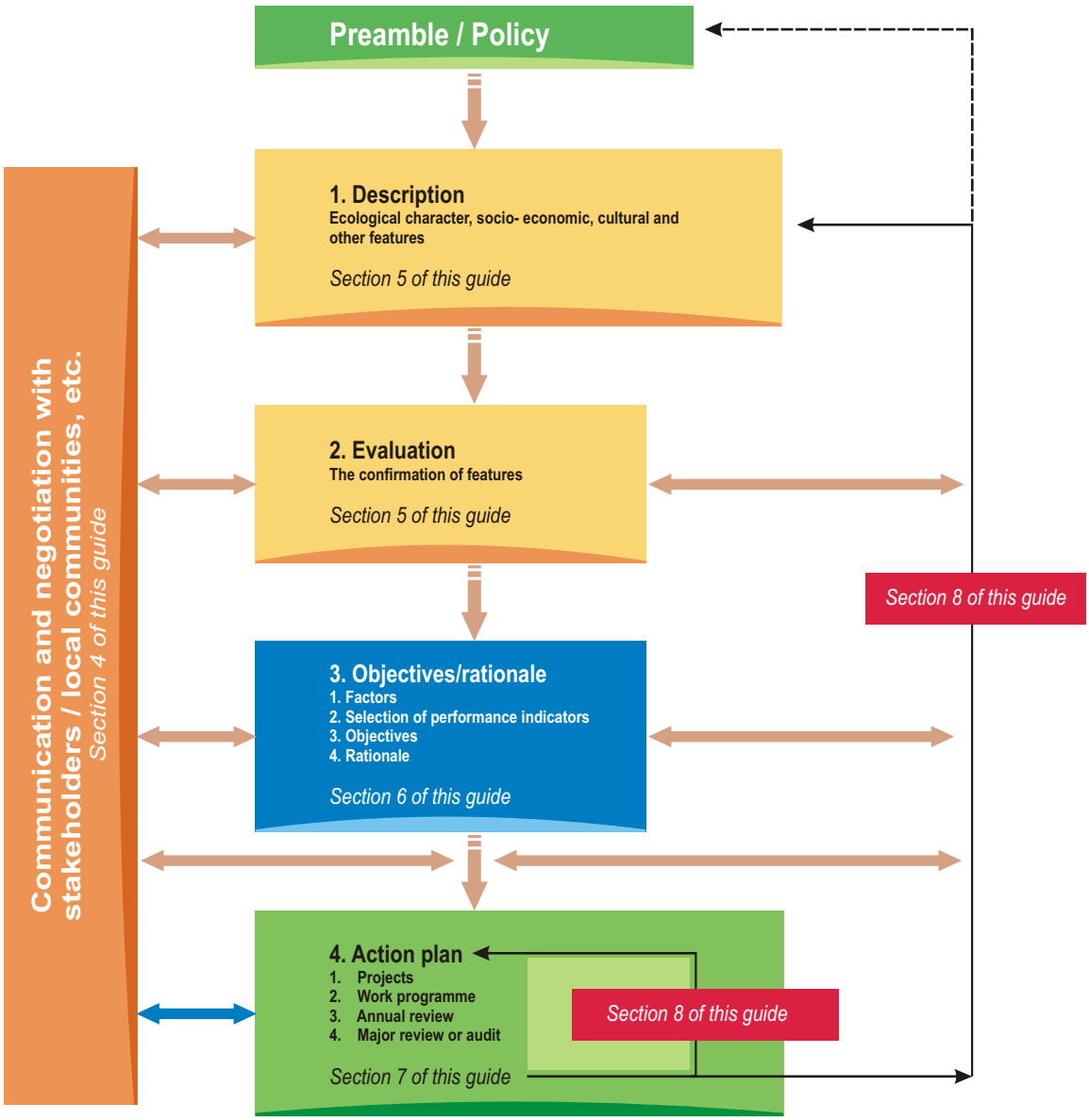


Fig. 2. Overview of steps in management planning.

Source: Managing wetlands. Ramsar Handbook No. 16, 3rd edition, 2007.

Since the management plan is a product of a carefully orchestrated process, much more is required than a simple 'manual'. Resources, skills and organizational systems are needed to ensure success in management planning.

Successful management planning is characterized by the following features (after Thomas & Middleton 2003):

- It is a **process**, not an **event**, i.e. it does not end with the production of a plan, but continues through its implementation and beyond.
- It is concerned with the **future**. It identifies concerns and future alternative courses of action and examines the evolving chains of causes and effects likely to result from current decisions.
- It provides a **mechanism** for thinking about threats and opportunities and other difficult issues, for **solving problems** and **promoting discussion** between involved parties.
- It is **systematic**. Most planning exercises work through a pre-determined sequence of steps that give structure to the process and encourage a logical approach. A systematic approach helps to ensure that decisions are based on knowledge and analysis of the subject and its context, and helps others to understand the rationale for proposed actions.
- It also involves **value judgements**. Management planning can be thought of as a 'process which embraces the identification of what a [protected area] is and what it **should** become and how to maintain or attain that desired condition in the face of changing internal and external conditions'. The use of the word 'should' implies that value judgements help determine what 'should be', as well as 'what is'. Planning for protected areas is thus centred not only on analysis of the objective condition of the natural resource, but also on people and their opinions.
- It takes a **'holistic'** view. The planning process can, if carried out openly and inclusively, take into consideration a very wide range of issues, views and opinions. When applied to a particular area, it should be able to include all processes and issues arising within it, as well as those arising outside its boundaries. How integrated or 'holistic' the process is will depend, however, on how the process is carried out, who is involved and how the final decisions are made.
- It is a **continuous** process. It is never static. It must adjust to changing conditions and goals.

Adopting a flexible and adaptable approach helps wetland managers take account of, and respond to changing factors — natural, economic or political — and thus demonstrate that management is appropriate and effective.

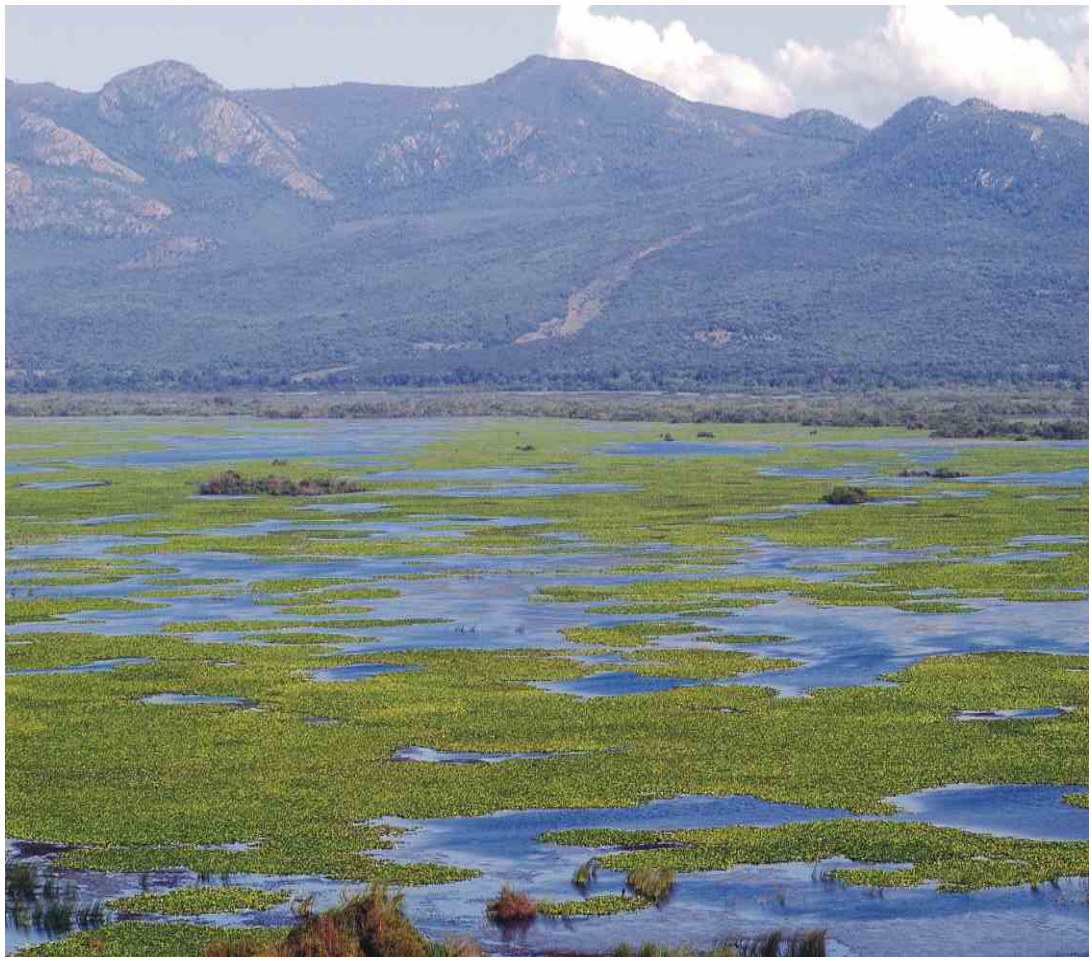
See the *Case Study 3* for further information.

Where to find further information

Salafsky, N., Margoluis, R. & Redford, K. 2001. Adaptive Management; A Tool for Conservation Practitioners. Biodiversity Support Programme, Publication No. 112.
http://www.worldwildlife.org/bsp/publications/aam/112/titlepage.htm

Thomas, L. & Middleton, J. 2003. Guidelines for Management Planning of Protected Areas. World Commission on Protected Areas, Best Practice Protected Area Guidelines Series No.10. IUCN, Switzerland.

Hints on preparing a comprehensive wetland management plan. 1992. Lane Council of Governments Public Service Building 125 E. 8th Ave. Eugene OR 97401(503) 687-4243.
http://www.rice.edu/wetlands/Reports/R12_1.html



WWF - Canon / Michel Gunther

Tonga Lake Ramsar Site with mountains in the background. El Kala National Park, Algeria.

4. Successful wetland management planning

Building partnerships with local communities

Participatory management is described by the Ramsar Convention on Wetlands as a learning process that helps improve joint capacities for study and action among all those involved in the conservation of wetlands. Wetland management planning that is inclusive has a much better chance of success. The long-term success of any management plan is dependent on the understanding of, and support for, management goals among the stakeholders. There is a strong synergy between communication, education and public awareness and participatory management, as directly involving people in wetland management builds awareness of the values of the site.

Through its Communication, Education and Public Awareness (CEPA) Programme, the Ramsar Convention aims to motivate people 'to appreciate the values of wetlands so that they become advocates for wetland conservation and wise use and may act to become involved in relevant policy formulation, planning and management' (Resolution VIII.31; Wetland CEPA. Ramsar Handbook No. 4, 3rd edition, 2007). Accordingly, the Ramsar Convention strongly urges its signatory governments to recognize CEPA as underpinning the effective delivery of wetland management instruments at all levels.

Communication, education and public awareness (CEPA) are regularly on the list of key strategies for the management of natural areas, such as wetlands. Using CEPA effectively can build support for wetland conservation through facilitating increased awareness of wetland values. However, wetland managers often do not have the skills to develop complimentary CEPA strategies for their site.

This part of the guide provides you with (a) advice on encouraging effective participation in the management planning process, (b) an outline of the steps for identifying and building partnerships in the community, and (c) a list of strategies that can be used for building CEPA into the management plan.

Benefits of a participatory approach to management planning

Involving legitimate stakeholders in the management planning process, particularly local communities and indigenous people, will be beneficial in a number of ways.

- Involving stakeholders from the outset of the planning process helps to define priority concerns.
- Stakeholder interests can have positive or negative implications for site management. Likewise, the proposed management interventions may have a considerable impact on the lives or livelihoods of local stakeholders. It is important therefore that those interests be considered and where they do not detract from the ecological and other values of the site, incorporated into management planning.
- A participatory approach to identifying site values will build commitment towards managing those values in the long term.
- Legitimate stakeholders can hold important knowledge about the site. Incorporating knowledge from those directly related to the wetland, facilitates valuable exchanges of information, combining traditional or historical knowledge with scientific knowledge.

- Involving stakeholders in the planning process will assist in the long term to develop a shared vision for the wetland and aids in the development of measures for achieving outcomes.

Written agreements are optional and their usefulness or suitability depends on the context. They may be useful in situations where private land owners are used to making land-use decisions in relation to their property. In other cases written agreements may not be appropriate, especially when they are not a part of the local culture, or if the local people have a history of being deprived of their resources through treaties or similar documents.

Source: Participatory skills. Ramsar Handbook No. 5, 3rd edition, 2007.

Involving local stakeholders in identifying the objectives of the management plan will benefit from CEPA processes. The management objectives will provide the initial focus for CEPA-related actions. While the wetland manager(s) has ultimate responsibility for the implementation of the management plan, building partnerships to develop the plan will build support for implementation. This is important whether the wetland is owned and managed publicly or privately

Building trust among stakeholders

Identifying and informing stakeholders of the management planning process is the first step. A 'stakeholder' is any individual, group or community living within the influence of the site, or likely to influence the management of the site, especially those dependent on the site for their livelihood (Managing wetlands, Ramsar Handbook No. 16, 3rd edition, 2007). This can include wetland neighbours, indigenous communities, historical users and special interest groups such as nature watchers for whom the site has special significance.

The management planning team should actively seek participation in the planning process through comprehensive communication. The team should work cooperatively and use consensus to identify the management objectives for the site. Communication should be clear and realistic about the aim of the process.

Local and historical knowledge of the wetland can contribute significantly to the development of management strategies, especially when blended with the best available science. So it is important for managers to be aware of factors that could affect possible participation or non-participation of stakeholders. This knowledge will influence the approach a manager may take to achieve a management objective. For instance, stakeholders may perceive that the aim of the planning process goes against their interests. Alternatively, a lack of understanding may constrain participation and CEPA processes can be instrumental in increasing understanding, as well as increasing willingness to participate. Stakeholders may benefit from awareness-building and education to fully appreciate the values of the wetland, allowing them to fully participate in the planning process.

Building awareness among the stakeholder groups most relevant to the management objective

Once the management objectives have been determined, CEPA strategies should target those sub-groups who are most critical to achieving each of them. The CEPA actions chosen should aim to target

the right audience, focus on what they need to know and provide the information that increases understanding, and thereby, builds support. For instance, if the management objective is about securing water for the wetland, the target group may be local irrigators. If the management objective is about invasive species, the target group may be wetland neighbours.

Local knowledge will make an important contribution to the information base that supports the management plan. Finding out what stakeholders know, and what they don't know, is an important step, as it is more effective to build on what people already know. Insights gained through consultations as part of the management planning process can go a long way in understanding what people feel, know and understand about the wetland. It is also important to be sure that stakeholders have some understanding of cause and effect, and can see the connection between their own (perhaps small-scale) practices and the individual or cumulative (larger-scale) effects on wetland values. When people do not fully understand how particular practices impact negatively on the wetland, they may see no reason to change their behaviour.

It is also important to consider how people in the local community obtain information. What are the sources and methods of communication to which they have easy access? What methods do they prefer? Are there local leaders who will have strong credibility as messengers and communicators?

Answering such questions will help decide what additional understandings need to be offered and how they should be delivered to build support for the management objectives.

Gaining support through incentives

Involving local communities should include an incentives approach. If local stakeholders are to be effectively involved, they will need to understand how their involvement will deliver benefits to them. More importantly, those benefits must be attractive. A management plan must aim to identify management objectives which will deliver benefits not only to the wetland, but also to the local community.

Here again, education may be effective in making clear the links between stakeholder interests and the ecosystem (and other) values of the wetland. A local stakeholder may not care if biodiversity values fall, unless it affects his/her own values or interests. A CEPA approach can focus in the first instance on the values and interests of the stakeholders, rather than exclusively on the biodiversity values. Through the planning process the links between these can be made more explicit, and appropriate.

Participatory skills (Ramsar Handbook No. 5, 3rd edition, 2007) includes extensive guidance and case studies on incentives. The examples include incentives related to the maintenance of sustainable livelihoods, and activities such as:

- maintaining spiritual and cultural values associated with a wetland;
- more equitable access to wetland resources;
- increasing local capacity and empowerment;
- reducing conflicts among stakeholders; and
- maintaining ecosystem functions (such as flood control, improved water quality, etc.).

Building capacity for continuing involvement

Stakeholders who wish to become actively involved in the implementation of the management plan may need training in areas such as organizational and negotiating skills, keeping of records and financial accounts, and basic administrative skills. Engaging local stakeholders in site monitoring and process evaluation makes a valuable and substantive contribution in achieving participatory conservation objectives. This, however, will usually require training to provide stakeholders with the necessary tools and skills. To help encourage ongoing continuity and financial stability it may be useful to investigate cooperative or legal-type arrangements, such as a letter or memorandum of agreement, between the key organisations involved in implementing the management plan.

Who needs to know about your wetland? Improving public awareness of wetland values as a management objective

Improving public awareness of wetland values through CEPA can be identified as one of the objectives in the management plan. This will assure that communication and education strategies will be considered and developed as complementary processes leading to the overall management effectiveness of the wetland site being strengthened. Above all, it is important to focus on identifying the most critical aspects of the wetland that people need to understand in order to encourage their support for the management objectives. CEPA strategies from simple to complex, which can be used to increase public awareness and build support, are briefly described in 'CEPA strategies' below.

Once you have identified the information you wish to deliver, building and packaging the message is the next step. Simple messages can be used in a number of ways, forming the basis for fact sheets, brochures and signs.

For those who are not familiar with the wetland, providing opportunities to experience the site directly can be beneficial and provide valuable opportunities for awareness raising.

Building effective messages

Use positive, familiar points that are already agreed upon 'Our wetland has supported the local community for centuries. Better management will guarantee its future.'

Localize the message A 'message' may be used in many ways, as a theme for a brochure or a video, in presentations to local groups, or even through small products such as stickers. However, the message must be translated into the language and products that suit the target audience.

Invite a response All messages should have a purpose and invite response from the audience. Be clear about what you want from the audience. For example the message may begin with, You can help by...

Direct involvement in management activities is a very effective strategy for building stakeholder understanding of wetland values, as well as providing training in relevant management skills.

CEPA strategies

Public awareness messages
Using a series of simple messages is an effective CEPA strategy.

Using local communication tools
Using the local media facilities, whether this be newspapers, newsletters or word of mouth, can be effective in reaching a broad range of people. Web sites can also reach some target groups.

Information products
Brochures, fact sheets and posters are examples of information products that can be developed. It is important to keep the content simple and suitable for the audience.

Meetings and consultations
Small or large gatherings with specifically targeted stakeholders can be very effective, especially when a higher level of involvement is intended, or when the implications of the measures proposed will be of great interest for a specific stakeholder group. It can also be very useful to target higher-level decision makers, who might be more willing to attend a lunchtime meeting than read a report or brochure.

Visitor access
Allowing people to visit the wetland can provide personal experiences that build understanding and support very effectively. Encouraging and providing support for visitors is an excellent way to develop tourism potential and this can help derive the resources needed for managing the site.

Interpreting the site for visitors
Interpreting the site for visitors, through signage, visitor facilities and dedicated guides, will enhance their experience at the site. Local communities often represent a rich repository of knowledge built up over time and this can form the basis of locally-based interpretation for a wetland.

Special events, community awareness days
Special events on suitable days such as World Wetlands Day (2 February) can be useful in building awareness and involvement over time.

Community education initiatives and programs
Where resources and expertise are available, education programs are a valuable addition to the management of a site. Education programs can be broad or specific to a particular audience, such as schools.

Dedicated facilities
Many wetlands around the world benefit from dedicated facilities which assist and enhance visitor access. Facilities can range from observation decks to bird hides to dedicated visitor's centres. The National Reports submitted by Contracting Parties for the Ramsar Convention's 8th Conference in 2002 indicated that over 400 wetland centres operate at or near Ramsar sites. And for the 2005 conference it was reported by 35% of Contracting Parties that they had established wetland centres during the previous three years, and 22% reported some progress in this direction (Ramsar COP9 Doc. 25). While these facilities may vary in scope, dedicated facilities provide a strong focus for wetland-related activities and can contribute greatly to participatory management.

See also *Case Study 4* from the Inner Niger Delta.

Where to find further information

Building Local Partnerships. A Guide for Watershed Partnerships.
http://www2.ctic.purdue.edu/KYW/Brochures/BuildingLocal.html

Effective Communication for Environmental Conservation A manual for and by environmental communicators in the Red Sea & Gulf of Aden region, Gwen van Boven for IUCN's Commission on Education and Communication
http://cms.iucn.org/resources/publications/index.cfm

Environmental Issues in the Tonle Sap: A Rapid Assessment of Perceptions. Prepared for the Asian Development Bank and available in PDF format at:
http://www.adb.org/Documents/Reports/Consultant/tonlesap-rapid-assessment.pdf

IUCN's Commission on Education and Communication provides some useful do's and don'ts for communication. **http://www.iucn.org/themes/cec/principles/donts.htm**

NSW Ramsar Wetlands Communication Programme (RWCP), NSW, Australia.
http://www.wetlands.org.au/WhoCaresAboutOurWetlands

Public participation in the context of the Mekong River Commission. Produced by the Mekong River Commission and available in PDF format at :
http://www.mrcmekong.org/download/free_download/Public_Participation_Mrc.pdf

Ramsar Handbooks No. 4 (Wetland CEPA) and No. 5 (Participatory skills), 2007.
http://www.ramsar.org/lib/lib_handbooks2006_e.htm

Wetland Link International (WLI) is a service operated by the Wetland and Wildfowl Trust, UK, which aims to link wetland education centres and educators. WLI is recognized by the CEPA Resolution as a cornerstone of the CEPA Programme. See
http://www.wwt.org.uk/text/297/research_papers.html

WWF - Canon / Michel Gunther

Qi Li Hai Nature Reserve. Coastal swamps surrounded by maize fields. Professional fishing is allowed in these freshwater swamps, Yellow Sea, North of Tianjin, China.

5. Knowing the wetland and its values

Describing wetlands

Start with the information that you and your team can gather to begin the planning process. Depending on the circumstances it is usually unwise to delay the planning process while more site data is gathered. This may take years and if a cautious approach is taken it is better to start the planning process moving ahead. Because management decisions will be made according to specific characteristics of your wetland, and surrounding land, a simple description and documentation of these resources is necessary.

Don't postpone the planning process until all the information is available

'A competent plan can be developed from relatively simple descriptions of the physical, biological and socio-economic characteristics of an area. More sophisticated data add to the confidence of the manager or planner, but they rarely justify a dramatic change of plan. The absence of site-specific information is not normally a good reason for postponing management in favour of more research' (Kelleher, 1999). Managers (and planners) rarely consider they have enough information and generally have to accept this situation: possible lack of information should not become an excuse for delaying the production of the plan.

Source: Thomas, L. & Middleton, J. 2003. Guidelines for Management Planning of Protected Areas. World Commission on Protected Areas, Best Practice Protected Area Guidelines Series No. 10. IUCN, Switzerland.

Data on your wetland may already be available through the 'Directory of Important Wetlands' for your country or region, or if it is a listed Ramsar site. The Information Sheet on Ramsar Wetlands (RIS), (*Appendix A*) gives some indications of the kind of data you need to collect and also provides a template to organise this data.

Avoid repeating work that has already been done. Look for available information with local administration, with former and current landowners or land-users, local groups and NGOs. Most countries have official surveys of natural resources, geological, forest, water resources etc. Try to use these data, which are often precise and of good quality. Make a list of all available maps and data. The best way to organize data from different sources and to make those data work, is to develop a simple, low-cost Geographical Information System (Lowry, 2006).

Examples of relevant data and sources

Data	Source of Information	
General	Statistic Services, Environmental Agencies, Ministries, Universities and Academies, Land Survey Offices, Authorities, Federal and Regional Offices for Environmental Protection, Federal and Regional Departments of Nature Conservation	
	Greece	Spain
Geographical and geological data -Origin/Formation -Geology -Geomorphology -Climate and soils -Size	Service of Geological Exploitation Ministry of Agriculture Topographical Service Meteorological Service Department of Agriculture	Regional Service of Infrastructures and Land Use Planning (Consejería de Obras Públicas y Ordenación del Territorio) Territorial Environmental Service (Servicio Territorial de Medio Ambiente) National Institute of Meteorology (Instituto Nacional de Meteorología) National Geographic Institute (Instituto Geográfico Nacional)
General hydrological data -Depth -Water quality -Average temperature -Nutrient budgets	State Amelioration Service National Health Service	River Duero Water Authority (Confederación Hidrográfica del Duero) Territorial Environmental Service,Government of Castile-Leon (Servicio Territorial de Medio Ambiente de la Junta de Castilla y León) National Institute of Meteorology (Instituto Nacional de Meteorología)
Current land use of the area -Agriculture -Forest -Settlement -Traffic -Industry -Fishery	Department for Agriculture State Forest Service Department for Planning and Environment Department for Traffic Department for Industry State Fishery Service	National Geographic Institute (Instituto Geográfico Nacional) Agriculture, Livestock and Fishery Service, Government of Castile-Leon (Consejería de Agricultura, Ganadería y Pesca de la Junta de Castilla y León) General Directorate of Traffic (Dirección General de Tráfico) Regional Office of Industry and Trade (Consejería de Industria y Comercios)
Conservation	Department for Planning & Environment in the Prefecture and Region Ministry for Environment, Planning and Public Works Forest Service	Regional Authority of Environment (Consejería de Medio Ambiente)

Source: Gattenlöhner, U., Hammerl-Resch, M., & Jantschke, S. (eds.) 2004. *Reviving Wetlands* Sustainable Management of Wetlands and Shallow Lakes. Living Lakes, Global Nature Fund.

'Ecological character' of a wetland

Understanding the ecology of a wetland helps determine how best to maintain the ecological processes that sustain the site. It also helps integrate a site plan within broader national planning frameworks.

The most useful type of site description is that based on a regularly updated inventory of core data. To begin this inventory, information on various features, (for example, hydrology, biota etc.), processes, (for example, nutrient cycling) and services (for example, climate regulation) collectively forming the ecological character of the wetland should be assembled and collated. This will help direct the rest of the management planning process.

Under the Ramsar Convention 'ecological character' and 'change in ecological character' are defined as follows (see Resolution IX.1, Annex A, November 2005 & Ramsar Handbook No. 1, Wise use of Wetlands 3rd edition, 2007)

"Ecological character is the combination of the ecosystem components, processes and benefits/services that characterize the wetland at a given point in time."*

And

"… change in ecological character is the human-induced adverse alteration of any ecosystem component, process, and/or ecosystem benefit/service."*

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

This wetland description should also focus on including information on any particular local features or characteristics of the site, especially its ecosystem services, that may be helpful in establishing priorities and setting management objectives. Since most of these ecosystem services are of great socio-economic importance, involving the relevant stakeholders and gaining their inputs in this characterization is highly desirable. A detailed list of parameters (not exhaustive) to assist in preparing a description is provided in *Appendix B*.

For further Ramsar guidance on describing "ecological character", see Section B of Ramsar Handbook No. 16, "Managing wetlands", 3rd edition, 2007.

How to make the site description readable and meaningful

1. Do not overload with information

Many management plans become large, cumbersome documents, with the greatest weight in the descriptive section! The description should not be excessively detailed. The descriptive information in the plan should be **relevant** to the management of your wetland, concise, and in a language easy for all stakeholders to understand, rather than full of scientific terms and jargon. The description should make reference to, but not contain sensitive data on rare or endangered species where there may be threats to these species, such data should remain **confidential**.

2. Quantify and qualify the facts and identify the assumptions
When presenting facts, these should be quantified wherever possible, and the sources identified. However, rather than set down 'half facts' without qualification, include phrases such as 'to the best of our knowledge'. *"This is better than giving people with specialist knowledge sticks with which to beat the plan and, by implication but perhaps wrongly, criticise other parts." (CCS 1989).*

If there are inherent biases in information, these should be identified. Assumptions made should also be specified. Most descriptions will be based on some assumptions, especially where there are gaps in information, or where information is unobtainable, inconclusive, too expensive to collect or outside the scope of the plan. In such circumstances, assumptions should be clearly stated.

3. Keep it brief use maps, references and appendices
Supporting information can be included in appendices, or simply referred to with references. Maps are another way of concisely presenting a lot of information. They can, for example, be used to illustrate or delineate geological formations, vegetation types, elevations, local climatic differences, location of major wildlife habitats, breeding and feeding grounds of migratory and non-migratory species, local settlement patterns, degrees of economic hardship and other factors relating to local communities and land uses.

4. Ramsar sites
Particular attention should be given to the description of the features of the site in the form of its 'ecological character' which provides the justification (see Ramsar Criteria for Identifying Wetlands of International Importance **http://www.ramsar.org/key_criteria.htm**) for its designation as a Ramsar site. In some countries this 'ecological character' is the baseline against which the impact of proposed developments, and success of site management, are judged by authorities responsible for planning.

5. Use local knowledge
When collecting information on the wetland and adjacent areas, local knowledge can be very valuable. It should be possible to use, and even pay, local people to gather some data. This may be cost effective and may enhance their interest and involvement in the plan (see section 4). The traditional knowledge held by indigenous people should be drawn on where available, and is usually willingly offered.

Source: Adapted from 'Thomas, L. & Middleton, J. 2003. Guidelines for Management Planning of Protected Areas. World Commission on Protected Areas, Best Practice Protected Area Guidelines Series No. 10. IUCN, Switzerland; and Ramsar Resolution VIII.14.

Wetland evaluation

Following the description of a site, which should aim to summarise available knowledge, evaluation is the process of identifying important features, ecosystem processes and services provided by a wetland. The purpose is to understand why the wetland is important not only to the local people, but also at wider scales. The process of evaluation helps to describe the 'values' associated with the wetland and identifies the reasons for its conservation.

While wetland functions are natural processes that continue regardless of their perceived value to humans, the value people place on those functions in many cases is the primary factor determining whether a wetland remains intact or is converted to some other use. It is important therefore, that, local people and other stakeholders, through the process of evaluation, identify and describe the values they hold for the wetland.

For Ramsar sites and other wetlands, evaluation should be undertaken of features that determine its 'ecological character', as well as focus on the ecosystem services that the wetland provides. Where appropriate, evaluation should also consider any significant cultural and religious features. Geological, geomorphological and landscape significance of the wetland should also be considered. Unless the wetland ecosystem services are fully understood, there is a risk of management actions being ineffective.

Examples of ecosystem services provided by wetlands

Supporting services
Services necessary for the production of all other ecosystem services

- Soil formation
- Nutrient cycling
- Primary production

Provisioning services
Products obtained from ecosystems

- Food
- Fresh water
- Fuel wood
- Fuel
- Biochemicals
- Genetic resources

Regulating services
Benefits obtained from regulation of ecosystem processes

- Climate regulation
- Disease regulation
- Water regulation
- Water purification
- Pollination

Cultural services
Non-material benefits obtained from ecosystems

- Spiritual and religious
- Recreation and ecotourism
- Aesthetic
- Inspirational
- Educational
- Sense of place
- Cultural heritage

Source: Millennium Ecosystem Assessment, 2003. Ecosystems and Human Well-being; A Framework for Assessment. Island Press, Washington, D.C..

Step 1. Ecological evaluation

The process of evaluation starts with the key features central to the ecological character of a wetland. The table below lists the criteria recommended for the evaluation of features (Managing Wetlands. Ramsar Handbook No. 16, 3rd edition, 2007). The list is not intended to be comprehensive. Only the relevant or useful criteria should be used, and additional criteria should be added as circumstances require.

Criteria	Short description	Measurement unit
Size	• Small areas of high quality habitat can often be more highly valued than large areas of low quality habitat. • Fragmented habitats should be considered carefully	• Habitat diversity: a mix of open water, emergent, shrub and forested wetland habitat types • Dominance of native species • Habitat continuity and connectivity with adjoining natural habitats (landscape context)
Naturalness/Integrity (representativeness)	Degree of human presence in terms of physical, chemical or biological disturbance	• Air, water, soil quality • % key species • Minimum critical ecosystem size
Diversity	Variety of life in all its forms, incl. ecosystem, species and genetic diversity	• No. of species/surface area • No. of ecosystems/geographical unit
Uniqueness/Rarity	Local, national or global rarity of ecosystems and species	• Endemic species and sub species • Genera with very few species • % surface area remaining
Fragility/Vulnerability	Sensitivity of ecosystems to human disturbance	• Resilience, energy budget • Resistance, carrying capacity
Renewability/ Recreatibility	The possibility of (spontaneous) renewability or human restoration of ecosystems	• Complexity and diversity • Succession stage/-time • (Opportunity) costs

Source: De Groot et al., 2006. Valuing Wetlands. Ramsar Technical Report No. 3.

Step 2. Socio-cultural valuation

Identifying the socio-cultural importance of a wetland is an integral part of the evaluation process. Involvement of the local community in the evaluation can increase acceptability of the management plan and thus secure co-operation in its implementation.

Social criteria (values)	Short description	Measurement unit & assessment method
Therapeutic value	The provision of medicines, clean air, water and soil, space for recreation and outdoor sports and general therapeutic effects of nature on people's mental and physical well-being	• Suitability and capacity of natural systems to provide 'health services' • Restorative and regenerative effects on people's performance • Socio-economic benefits from reduced health costs and conditions
Amenity value	Importance of nature for cognitive development, mental relaxation, artistic inspiration, aesthetic enjoyment and recreational benefits	• Aesthetic quality of landscapes • Recreational use • Artistic use • Preference studies
Heritage value	Importance of nature as a reference for personal or collective history and cultural identity	• Historic sites and features • Role in cultural landscapes • Cultural traditions and knowledge
Spiritual value	Importance of nature in symbols and elements with sacred, religious and spiritual significance	• Presence of sacred sites or features • Role of nature in religious ceremonies and sacred texts
Existence value	Importance people attach to nature for ethical reasons (intrinsic value) and inter-generational equity (bequest value)	• Expressed through, for example, donations and voluntary work or stated preference for nature protection for ethical reasons

Source: De Groot et al., 2006. Valuing Wetlands. Ramsar Technical Report No. 3.

Step 3. Economic valuation

The challenge now is to translate wetland characteristics (processes and components) into a comprehensive list of ecosystem services. These can then be quantified in appropriate units (biophysical, monetary) to determine their value (importance) to human society, also known as economic evaluation. The selection of services (functions) to be included in the evaluation process should be done in close consultation with the main stakeholders. Economic evaluation of ecosystem services can be done not only in monetary units but also by their contribution to employment and productivity, for example, in terms of number of people whose jobs are related to the use or conservation of wetland services, or the number of production units which depend on wetland services.

Appendix C presents a list of wetland services, the types of wetlands which provide them and the general relative magnitude in which they provide these services. Note that the relative magnitude of services will differ depending on the characteristics of each particular wetland. This table can help by providing a first indicative listing of services provided by a wetland that can then be further refined through consultation with the local community/stakeholder groups.

Some of these may overlap with ecological and/or socio-cultural values. This simply means that the related services have economic value, in addition to their ecological and socio-cultural importance values, which sometimes can be expressed in monetary units. The methods for carrying out economic evaluations can sometimes be complex and may require expert help.

For further recent information on approaches and methods for wetland valuation, see Ramsar Technical Report No. 3, Valuing wetlands, De Groot et al., 2006, available on:
http://www.ramsar.org/lib/lib_rtr_index.htm

Wetland functions are varied and diverse, depending upon the wetland class, location, and size. Any evaluation of wetland functions must take into account:

- the regional and inter-regional linkages of such functions;
- the associated social/cultural and production functions of biological and hydrological/biogeochemical natural system attributes;
- the monetary and non-monetary value of such functions and relationships;
- the potential costs, both direct and indirect, resulting from potential wetland conversion; and future/potential benefits that may derive from the wetland as all benefits which a wetland can support may not currently be present.

Source: Wetland Evaluation Guide, North American Wetlands Conservation Council (Canada), March 1992 Available from: **http://wlapwww.gov.bc.ca/wld/documents/WEG_Oct2002_s.pdf**

TOTAL VALUE / IMPORTANCE OF A WETLAND

Ecological (Based on Ecological Sustainability)	Socio-cultural (Based on Equity and Cultural Perceptions)	Economic (Based on Efficiency and Cost-effectiveness)
Valuation/Importance Criteria - naturalness - diversity - uniqueness - sensitivity - renewability	Valuation Criteria - health value - amenity value - cultural identity - spiritual value - existence value	Valuation Criteria - employment - productivity - income - monetary values of ecosystem services

Example of evaluation of wetlands

The following table (see next page) provides the basis for a comparison of the full range of wetland values to help make informed decisions while preparing a management plan. This is designed to help those who must deal with the conversion, modification or conservation of wetlands to identify all of the functions and values involved, to aid them in assessing the trade-offs that may be necessary, and to foster informed and rational decisions concerning the use and management of wetland environments.

	Are criteria present?							Level of criterion significance					Expected impact of project upon wetland values			Comments
Summary of wetland values significance and expected impact	Yes	Likely	Possibly	No	Unknown	Critical Only if listed yes	CRITICAL only if	National	Provincial	Regional	Local	Negligible	High	Moderate	Low	
1. Life support values																
Hydrological values																
Biogeochemical values																
Habitat values																
Ecological values																
2. Social/cultural values																
Aesthetic values																
Recreational values																
Education and Public awareness values																
Public Status values																
Cultural attribute values																
3. Production values																
Agricultural values																
Renewable resource values																
Non-renewable resource values																
Tourism and Recreational values																
Urban values Total Occurrences																

For detailed tables on each of these values please refer to Wetland Evaluation Guide, North American Wetlands Conservation Council (Canada), March 1992.
http://wlapwww.gov.bc.ca/wld/documents/WEG_Oct2002_s.pdf

Where to find further information

Countryside Commission for Scotland. 1989. Management plans for country parks : a guide to their preparation. Countryside Commission for Scotland, Perth, UK.

Barbier, E.B., Acreman, M. & Knowler, D.1997. Economic valuation of wetlands: a guide for policymakers and planners. Ramsar Convention Bureau, Gland, Switzerland.126 pp. Available from **http://www.ramsar.org/lib/lib_valuation_e.htm**

De Groot, R.S., Stuip, M.A.M., Finlayson, C.M. & Davidson, N. 2006. Valuing wetlands: guidance for valuing the benefits derived from wetland ecosystem services, Ramsar Technical Report No. 3/CBD Technical Series No. 27. Ramsar Convention Secretariat, Gland, Switzerland & Secretariat of the Convention on Biological Diversity, Montreal, Canada. Available on: **http://www.ramsar.org/lib/lib_rtr_index.htm**

Kelleher, G. 1999. Guidelines for Marine Protected Areas. IUCN, Gland, Switzerland and Cambridge, UK

Lowry, J. 2006. Low-cost GIS software and data for wetland inventory, assessment and monitoring. Ramsar Technical Report No. 2. Ramsar Secretariat, Gland Switzerland. Available on **http://www.ramsar.org/lib/lib_rtr_index.htm**

http://www.wetlands.org/RSDB/default.htm click on 'Search the Ramsar Sites Database' to access the Ramsar Information Sheet and other site information.

http://water.usgs.gov/nwsum/WSP2425/

http://www.environment.gov.au/ssd/tropical-rivers/pubs/ecosystem-assessment-wetlands-nt-summary.pdf

http://www.biodiversityeconomics.org

http://www.naturevaluation.org

http://www.ecosystemvaluation.org

WWF - Canon / Edward Parker

Varzea Flooded Forest, at almost the height of the annual flooding period, is a breeding ground for more than 200 fish species. Amazonas, Brazil.

6. Setting management objectives

The management planning process should develop and articulate an ideal or desired condition, state or appearance for the future of the wetland. To define this, measurable objectives for the important site features (ecological, socio-cultural or the ecosystem services) need to be identified through an evaluation process.

Objectives are an expression of a 'desired state' that should be achieved for a key site feature through wetland management. They are thus statements of 'outcomes' rather than how to achieve them.

Preparing measurable objectives requires three key steps to be completed:

Describe the condition that is required for a feature

For each identified key feature, prepare a simple statement about the conditions the plan is attempting to obtain or maintain. (See examples in the box below).

A generic approach towards defining the condition in which it is wished to maintain a feature, has been developed by the European Union for Natura 2000 protected areas. It requires that features on these sites be maintained at 'favourable conservation status'. Two examples below illustrate the approach:

Habitats are in favourable conservation status when:

i. they are stable or increasing in area;
ii. they are sustainable in the long term;
iii. the condition of typical species is also favourable; and
iv. the factors that affect the habitat or its typical species are under control.

Species are in favourable conservation status when:

i. the population is viable in the long term;
ii. the range is not contracting;
iii. sufficient habitat exists to support the species in the long term; and
iv. the factors that affect the habitat, or its typical species, are under control.

Source: European Union Natura 2000 sites:
http://ec.europa.eu/environment/nature/natura2000/index_en.htm

Similar statements about 'favourable status' should also be developed for features related to human activities and/or practices within the site and/or the buffer zone, in particular in relation to their sustainability and the carrying capacity of the site.

Identify the factors that influence the feature, and consider how this may change as a consequence

The ability to achieve the stated objectives will be dictated by the factors influencing those features; these thereby causing change in ecological character (see previous section for definition). It is important that both negative and positive factors be considered, since both will have implications for management.

Positive and negative examples of these categories of factors with implications for wetland features:

Category	Example(s)
Internal natural factors	Natural succession in vegetation. Variations in water level caused by precipitation.
Internal human-induced factors	Spread of invasive alien species. On-site pollution. Inappropriate, or unsustainable, agricultural practices.
External natural factors	Positive or negative impacts of climate change. Variations in currents or sea level.
External human-induced factors	Diversion of water supply. Changing natural pattern and variability of water flows. Effective water allocation regimes. Increased or decreased sedimentation caused by upstream engineering works. Pollution.
Legislation and tradition related factors	Legal obligations arising from national or local legislation or international commitments. Traditional and culture issues may include grazing, fishing, and logging rights and/or religious aspects.
Factors arising from conflicts/communality interest	Likely opposition or support of different stakeholders, depending on whether they see the management plan as contributing to maintain their benefits or not, or providing an opportunity to develop their interests.
Physical considerations and constraints	Inaccessibility, which may affect the achievement of management objectives.
Institutional factors	Any limitations to the capacity and authority of organizations responsible for plan implementation, and the inter-relationship (or lack of it) between the organizations or agencies responsible for wetland conservation and wise use and those responsible for other sectors directly or indirectly affecting the wetland, at local, regional (sub-national) and national scales.

Source: Managing wetlands. Ramsar Handbook No. 16, 3rd edition, 2007.

Uncontrollable factors that may or may not be of human origin must also be taken into account. For example, climate change and invasive species can alter stability and frustrate the ability to measure, predict or sustain desired conditions, and avoidance or control may be impossible. Early recognition of these management limitations can facilitate the development of contingency measures.

Once the factors have been identified, the effect they will have on each of the features should be considered. Features will change as a consequence of the factors, and it is important that the direction of change, and potential indicators of change, should be identified. These will in turn be guided by the operational limits set for these factors.

Operational limits

The purpose is to define a range of values for each factor which will be considered acceptable and tolerable levels to provide a focus for surveillance.

- Acceptable limits should be defined for the most significant factors known to have an impact on the features.
- Upper limits are usually applied to undesirable factors - they define maximum tolerance, and lower limits are applied to positive factors.
- Operational limits are an early warning system, acting as a trigger for action, reached long before there is any threat to long-term viability of the feature.
- Limits are not fixed forever, they can be revised.

Monitoring Factors

- Factors which have been quantified and are subject to the operational limits must be monitored. When, and if, the limit is exceeded, management or control will be implemented.
- Factors for which limits cannot be set, because their relationship with the feature is unclear, should be put under a recording program to establish limits for monitoring.
- Any new factors, for example development proposals, on or off the site, that are likely to have a significant impact on the ecological character of the site, should be subject to a full Environmental Impact Assessment.

Identify and quantify a number of performance indicators for monitoring progress in achieving the objectives for that feature

Performance indicators tell how well the work is progressing. This stage in the planning process identifies the performance indicators that will be used to indicate condition of a feature and thus help in putting forward measurable objectives. The performance indicators should be selected with the following in mind:

- these are characteristics, qualities or properties of a feature that are inherent and inseparable from that feature;
- should be indicators of the general condition of a feature, and should be informative about something other than themselves;

- must be quantifiable and measurable; and
- should provide an economical method for obtaining the evidence required to enable the current condition of a feature to be determined.

Examples of possible performance indicators

i. For species

a. Quantity (size of a population)
- the total number of individuals present
- the total number of breeding adults
- the population at a specified point in an annual cycle
- the extent or distribution of a population

b. Quality
- survival rates
- productivity
- age structure

ii. For habitats

a. Quantity
- size of area occupied by the habitat
- distribution of the habitat

b. Quality
- physical structure
- individual or groups of species indicative of condition, e.g. populations of threatened species
- individual or groups of species indicative of change, e.g. presence of invasive species

Source: Managing wetlands. Ramsar Handbook No. 16, 3rd edition, 2007.

Likewise, performance indicators for socio-economic and cultural features should be identified. Some examples are provided below:

- number of local people employed;
- contribution of the protected area or wetland site to local incomes;
- maintenance of cultural traditions and practices;
- maintenance of the physical condition of historical objects;
- educational and information activities in the wetland; and/or
- degree of participation of local people in decision-making about the wetland.

Performance indicators are bound by certain specified limits which represent thresholds for action and should trigger an appropriate response. These specified limits define the degree to which the value of a performance indicator is permitted to fluctuate without creating any cause for concern, for example, no less than a 10% drop in a species' population.

Limits for performance indicators related to ecological features must be developed keeping in mind the natural dynamics and cyclic change in populations and communities, and their carrying capacity limits. Some of these indicators may fall in the category of 'early warning' indicators. Inclusion of early warning indicators in a monitoring program is a precautionary management approach - that information on early change is acted upon as management interventions before real and important ecosystem-level changes have occurred. Most early warning indicators available have been developed to predict or forewarn of important chemical changes, (namely, pollution) in wetlands. These can be grouped into three broad categories:

a. rapid response toxicity tests;

b. field early warning tests, and

c. rapid assessments.

For details see Managing wetlands. Ramsar Handbook No. 16, 3rd edition, 2007.

Ideal attributes of early warning indicators

a. Anticipatory: It should occur at levels of organization, either biological or physical, that provide an indication of degradation, or some form of adverse effect, before serious environmental harm has occurred.

b. Sensitive: In detecting potential significant impacts prior to them occurring, an early warning indicator should be sensitive to low-level changes, or early stages of the problem.

c. Diagnostic: It should be sufficiently specific to a problem to increase confidence in identifying the cause of an effect.

d. Broadly applicable: It should predict potential impacts from a broad range of problems.

e. Correlated to actual environmental effects/ecological relevance: An understanding that continued exposure to the problem, and hence continued manifestation of the response, would usually or often lead to significant environmental (ecosystem-level) adverse effects.

f. Timely and cost-effective: It should provide information quickly enough to initiate effective management action prior to significant environmental impacts occurring, and be inexpensive to measure while providing the maximum amount of information per unit effort.

g. Regionally or nationally relevant: It should be relevant to the ecosystem being assessed.

h. Socially relevant: It should be of obvious value to, and observable by stakeholders, or predictive of a measure that is socially relevant.

i. Easy to measure: It should be measurable using a standard procedure with known reliability and low measurement error.

j. Constant in space and time: It should be capable of detecting small changes and of clearly distinguishing that a response is caused by some anthropogenic source, not by natural factors as part of the natural background, (i.e. have a high 'signal to noise' ratio).

k. Non-destructive: Measurement of the indicator should be non-destructive to the ecosystem being assessed.

Source: Managing wetlands. Ramsar Handbook No. 16, 3rd edition, 2007.

Developing the portfolio of performance indicators (including some early warning indicators), with their threshold limits, and identifying the factors within their specified operational limits, will not only help define measurable objectives for wetland management, but also a clear monitoring plan.

For detailing measurable objectives for each of the key features of the wetland, begin with the description of the condition required for the feature, followed by the operational limits for the main influencing factors, and then the selected performance indicators, with defined limits.

Where to find further information

Thomas, L. & Middleton, J. 2003. Guidelines for Management Planning of Protected Areas. World Commission on Protected Areas, Best Practice Protected Area Guidelines Series No. 10. IUCN, Switzerland.

http://ec.europa.eu/environment/nature/natura2000/index_en.htm for information on EU Natura 2000 sites and the Habitats and Birds Directives.

WWF - Canon / Hartmut Jungius

Temporary wetlands after heavy rainfall,Western Kopetdagh, Turkmenistan.

7. Achieving management objectives

Local managers are truly the experts on specific sites because of the local understanding of water regime, topography, soil type, composition of vegetation, problem plants, and other management constraints. This section provides conceptual information on the strategies useful for wetland management and, combined with local knowledge relating to the specific problems and characteristics of a site, management effectiveness can be enhanced.

Selection of management strategies

Once management objectives have been set so that it is clear what is to be done, and where, the next step is to decide how the objectives will be met. A strategy or a combination of strategies must be selected and used for achieving the management objectives. This section is but a small window to the plethora of wetland management strategies, tools and techniques available. We have tried to provide you with links for more detailed information, where we can.

Wetland management strategies for the following areas of activity may be useful:

- Water management
- Habitat management
- Species management
- Management of socio-economic values and use
- Creating zones

Water management

The health of wetland ecosystems depends on the hydrological regime and they are very vulnerable to certain changes. The spatial and temporal variation in water depth, flow patterns and water quality (temperature and chemistry), as well as the frequency and duration of inundation, are often the most important factors determining the ecological character of a wetland (see definition in section 5).

For most wetlands, direct rainfall provides only a small proportion of the water regime, with the primary source being rivers or aquifers. Similarly, wetlands in the coastal zone are influenced by the quantity and quality of freshwater flowing into them from rivers and other land-based discharges and oceanic and marine waters from further offshore. Successful management of wetlands, therefore, requires maintenance of these sources of water.

A key requirement for wetland conservation and wise-use is to ensure that an adequate volume of water of the right quality is allocated to the wetland at the right time.

Guidelines related to implementing water allocations to wetlands

- Establish a long-term strategy or plan to manage water demand so as to achieve water allocations for wetland ecosystems.
- Allocate water as closely as possible to the natural regime (of both wetter and drier periods), using natural cues from reference catchments or to meet specific use requirements.
- Establish operating rules for droughts, floods, and emergency situations when rapid decisions may need to be made.

- Establish how existing infrastructure can be modified so as to release appropriate water allocations and water of appropriate quality, and ensure that new infrastructure meets this requirement.
- Disseminate real-time information about releases and flow patterns to stakeholders.
- Monitor compliance with water allocations and ensure appropriate actions and responses.
- Adapt management strategies in the light of monitoring and evaluation.

Source: Ramsar Resolution VIII.1/ Water allocation and management, Ramsar Handbook No. 8, 3rd edition, 2007

It is important that wetland managers take into account the wider context of river basin, groundwater system or coastal zone management processes for the region in which the wetland occurs, and interact with these planning and management processes so as to ensure that the water allocation needs of the wetland are recognized and fully incorporated in these wider frameworks.

Where to find further information

Water allocation and management. Ramsar Handbook No. 8, 3rd edition, 2007.
http://www.calwaterfowl.org/web2/leftcolumnmenu/habitatservices/habitatservicespdfs/wetlandmgmnt_guide.pdf

Habitat management

Whether natural or created, without proactive management, habitats in wetlands can be constantly changing. For example, for some wetland types the silting of open water areas, which are then invaded by emergent plant species, gradually raises the substrate level and reduces water depths. This can allow colonisation by terrestrial plants as well. This process, without active management, may lead to the establishment of a woodland replacing the wetland. Therefore, active management is often required to maintain wetlands in a favourable condition. Wetland habitat management can involve manipulating water levels, physical management of vegetation, monitoring the nature of change, minimizing non-target species, and managing people.

Conserving quality habitat for wildlife is essential

Managing wetland habitats to allow for the greatest quantity and highest quality of habitat possible to support waterfowl and other wetland-dependent wildlife is important. Without a large habitat base that includes breeding, migration, and wintering areas, waterbird populations will decline despite any attempt to restrict sport or other harvests. Wetland habitat management has importance beyond its value to waterbirds because conserving wetlands benefits many wildlife species.

Invasive species management

Invasive species often damage the function and health of wetlands and restrict beneficial uses by changing water quality, the nature of the substrate, or by consuming or out-competing native species. (See also Ramsar Resolutions VII.14 and VIII.18 on invasive species and wetlands).

Some of the commonly known invasive species are Water Hyacinth *Eichhornia crassipes*, Brazilian Waterweed *Egeria densa*, Giant Salvinia *Salvinia molesta*, Zebra Mussel *Dreissena polymorpha*. (For further information see Global Invasive Species Programme databases directory at: **http://www.gisp.org**).

Native aquatic vegetation: a problem

Under certain conditions, native aquatic plants can become a problem. Causes of abundant growth of native vegetation can be complex. Luxuriant growth often signals excessive nutrient concentrations in the wetland. High nutrient concentrations may originate in the wetland itself (internal loading), or from around the wetland, or elsewhere in the watershed (external loading). Such water quality problems require intensive management approaches that may differ from those needed to eliminate non-native plant invaders from a waterbody. Furthermore, management goals for troublesome native plants emphasize a reduction of growth, not elimination of the species from the system, as may be required for controlling non-native weeds.

Management of invasive species should be based on three main strategies:

Prevention

Once an invasive species is established in a wetland system it may be impossible to eliminate or control. The most effective invasive species management is to prevent initial introduction. This needs to occur at different levels ranging from effective national quarantine programs, to activities at the national, provincial, river basin and site level.

Prevention should involve some prediction of exotic species that may become a problem, and activities to ensure that they can be identified and turned away. See the Global Invasive Species Programme website: **http://www.gisp.org/**. Many governments have criteria to assess whether plants proposed for import are likely to be dangerous. For example, see the Australian Quarantine Inspection Services' 'weed risk assessment' guidelines at: **http://www.daffa.gov.au/ba/reviews/weeds**.

Managers should focus on the 'vectors' that may transport invasive species into the country, river basin or their site. They must work with the people and businesses concerned to gain their help and vigilance.

Some of the most dangerous vectors that bring invasive species into wetlands are:

(a) aquaculture using exotic species;

(b) aquariums and ornamental ponds;

(c) agriculture, including research stations;

(d) ornamental gardens, including botanic gardens and plant nurseries;

(e) zoos and aviaries;

(f) boats/ships that introduce species via unclean hulls and discharge of ballast water;

(g) unclean farm and construction equipment coming from areas infested with problem species; and

(h) transport of unclean agricultural produce.

Elimination or incursion management

Once an invasive species is present at the national, provincial, river basin or site scale there may be a window of opportunity to eliminate it depending on the biology of the species concerned. Incursion management requires wetland managers to identify potentially invasive species as soon as possible after their arrival, then plan and implement an eradication strategy. In some cases, invasive species that have

overrun adjacent habitats can be kept out of protected areas through programs designed to identify and eliminate new infestations.

Control

Once an invasive species has become established in a wetland area then eradication may not be feasible. A control program may then be required to reduce the impact of such species. Control should be a last resort since most control programs that are ongoing are expensive, and only partially successful in restoring environmental health.

Some control methods for invasive species

Physical methods

- Pulling by hand or cutting
- Bottom barrier application/sediment covers
- Water-level drawdown
- Watershed controls
- Water column dyes

Mechanical methods

- Harvesting and cutting
- Bottom tillage (rotovation)
- Diver-operated dredging
- Weed rolling

Biological methods

- Grass carp (irrigation and drainage canals only)
- Milfoil weevil

Chemical methods

- Fluridone
- Diquat
- Copper compounds
- Glyphosate
- Endothall
- 2,4-D

(Always to be applied subject to the relevant legal and health and safety considerations)

Using an integrated vegetation management approach, examine the alternatives with regard to such factors as:

- The extent of infestation of problem plant(s)
- Scale, intensity, and timing of treatment
- Effectiveness against target plant(s)
- Duration of control (short-term versus long-term)
- Human health and safety concerns and legal requirements
- Endangered or threatened species impacts
- Other environmental impacts and the associated mitigation, if needed
- Program costs
- Permit requirements (federal, state, local)

Reviewing control alternatives in light of these and other site-specific factors provides a means of narrowing down the options into an appropriate management package.

Source: Guide for Developing Integrated Aquatic Vegetation Management Plans in Oregon. 1999. **http://www.clr.pdx.edu/publications/files/iavmp.pdf**

Species management

Wetland species management strategies typically concern the need to conserve healthy populations of species by focusing on habitat conservation, since single species management is expensive and can have unintended consequences on other environmental attributes. Nevertheless, there are two cases for focusing on single species:

- maintaining viable populations of top predators, such as river dolphins and crocodiles, since if these species that are long lived and often small in number have healthy populations then most other species in that ecosystem are also likely to be conserved; and
- conserving threatened and rare species that require special management interventions.

Where to find further information

IUCN Red List of Threatened Species: **http://www.iucnredlist.org**
IUCN Species Action Plans: **http://www.iucn.org/themes/ssc/publications/actionplans.htm**

A combination of baseline knowledge of the habitat on one hand, and an understanding of the ecological requirements of wildlife species dependent on it on the other, will enable the wetland manager to draw up appropriate management strategies.

Waterbirds and fish are two important groups of animals for a wetland manager and usually find a prominent place in the management plan. Management strategies for waterbirds focus on maintaining a wide variety of habitats, ensuring adequate food supply and safety from disturbances, especially from anthropogenic factors (for example, pollution by agrochemicals).

Where the site managers need to manipulate the water flow systems to provide appropriate niches and support food chains for a multitude of species arriving and departing at different times of the season, this can become a rather complex and challenging task.

The wetland manager needs to pay particular attention to migratory bird species which require not only conservation of the wetland that is their final destination, but also other sites (key staging points, moulting sites) along the migratory flyway.

Where to find further information

http://www.birdlife.org/action/science/index.html
http://www.fws.gov/migratorybirds
http://www.fws.gov/endangered
http://www.epa.gov/owow/birds/tools.html

Fish are the most abundant vertebrates associated with wetlands, many being resident for all or part of their life cycles in wetlands. Wetlands provide important food sources for fish, or spawning grounds, nursery areas or their migration path. Many fish (including shellfish) have complex life histories, with spawning, nursery and feeding grounds widely separated and long migrations necessary between them.

It becomes important therefore to conserve all those areas essential for the completion of a fish's life cycle if species or stock is to be maintained. This can be a challenge for a wetland manager.

Management strategies need to focus on:

- maintaining hydrology
- removing barriers to migration
- maintaining riparian habitats
- reducing water pollution and sedimentation
- preventing invasion of exotic species
- harvest regulation

See the Murray Darling Basin Commission's Native Fish Strategy as a good example of how to plan good fish conservation at: **http://www.mdbc.gov.au/NFS**

Management of socio-economic values and use

Wetlands are critical for providing food, fuel and fibre important to the local culture and economy. Any management strategy for a wetland must incorporate these values and uses. In cases where the wetland begins to be exploited beyond wise-use or sustainable limits, the manager must intervene to regulate these uses and maintain the values of the site.

Exmples of socio-ecomonic values of wetland

Water storage and streamflow regulation

One of the most important effects of wetlands in the landscape is to absorb water and prolong river flows. In essence, the process by which water soaks into wetland soils ensures that water remains in the catchment for the longest possible time. Therefore, wetlands maintain the flow of streams and rivers that are essential to the well-being of people throughout the world.

Drought relief

In water-scarce areas the relationship between water storage and streamflow regulation are vital. At the height of a drought, the strain on freshwater resources means that quite apart from the requirements of plants and animals, human dependence on wetlands is exceptionally high.

Flood peak reduction

A characteristic of a catchment that is well-buffered with wetlands is the degree of attenuation of flood waters. It has been shown that wetland basins that are not already filled to capacity with water, reduce flood peaks and slowly release floodwaters to downstream areas.

Sediment accretion and protection from soil erosion

The dense plant cover that characterizes many wetlands fulfils an important role by intercepting overland flows. Surface runoff becomes dampened and the erosive powers of the water are greatly diminished. Furthermore, the reduction in the velocity of the inflowing water as it passes through the wetland, causes the release (or removal) of sediment being transported by the water. As a result, wetlands commonly act as a sediment sink.

Improvement in water quality

Wetlands contribute substantially to improving water quality and, for this reason are often referred to as 'nature's kidneys'. As already mentioned, the filtering action of wetland plants means that particulate matter settles in wetland basins. Many chemical transformations also take place in wetland environments and these ensure that the water leaving a wetland is much cleaner than when it entered. As a result of these processes, people downstream of wetlands generally receive good quality water.

Important food sources

Throughout the world, many cultures have adapted to and benefited socially and economically from wetlands. For example, wetlands have been used traditionally for centuries by the aboriginal people of Australia as a source of harvestable resources. These include plant materials (waterlilies and reeds) and animals such as turtles, filesnakes, geese and fish. Another example is rice.

Recreational and educational opportunities

Wetlands serve as recreation sites for fishing, hunting and observing wildlife. They provide open space for aesthetic enjoyment and opportunities for education and scientific study. Tourism is an important economic use of wetlands that has benefited people from all walks of life.

Agricultural production

The economic importance of crops and pastures grown on wetland soils is substantial. Conservative estimates from South Africa are that the quantity of hay produced in wetlands ranges between 10-15 tons of dry matter per hectare per year. This yield can be substantially increased if appropriate management practices are applied and, after being fed to livestock, the value production of each hectare of wetland under pasture can increase ten-fold.

Waste assimilation

Because of the proven efficiency of wetlands in the removal of numerous water-transported chemical substances, considerable interest exists in their use as waste removal systems, for the cleansing of water draining from mine sites, agricultural and municipal areas. This interest stems from the economic advantages to be gained from purging water of pollutants such as nutrients, pathogens and heavy metals.

Source: **http://www.environment.gov.au/ssd/nctwr.html**

Managers need to identify the most important use(s) of wetlands (through evaluation), and strategies have to be devised accordingly and in consultation with the community. A key strategy, however, for effective and sound management, is simultaneous incorporation of top-down and bottom-up measures within the social system. Top-down measures involve the incorporation of environmental concerns into policies, planning, and decision-making at the highest level. Initiatives then pass into the institutional and regulatory frameworks of jurisdictions sharing the watershed. Bottom-up measures involve incorporating environmental concerns into civil society at the community level.

Creating Zones: Using zonation as a management strategy

When dealing with large or complex sites it is often helpful to divide it into units and to treat these separately within the plan. Units or zones are usually subdivisions of a site, based on different criteria. These could be:

Ecological units

A large site may contain an intertidal unit, a coastal unit with dunes and saltmarsh, a woodland unit and a river and its valley. Each will need different management approaches.

Functional units

Here units are devised based on the predominant functions of the site. For example, the wetland could be divided into recreational, cultural, hunting, archaeological, historical, infrastructural, residential and commercial units. A separate subsidiary plan, which nests within the whole site plan, could be produced for each unit, in which part or all of the management plan format could be repeated.

Management zones

The process of unitization should not be confused with the splitting of a site into management 'zones' which is, in most cases, the division of a site into sections for similar management purposes. Zonation is optional. The division of a nature conservation site and neighbouring lands into a number of sectors is done for better management. For each management zone there are certain prescriptions which are short descriptions:

- the location of the zone (or zones, if there is more than one sector requiring similar management);
- the relevant strategy(ies) and
- time taken to implement.

Within each zone the management prescriptions will be reasonably uniform and will differ in type or intensity from the other zones in the plan. When a management project has been implemented, some zones may then be recombined with others. There are many different types of zoning systems, based on various criteria, such as zoning according to management intensity, (for example, maintenance versus restoration management). It is important to keep the zoning system as simple as possible. Not all zones of a zonation system need to be present on all sites and some sites are so homogenous that they do not require zoning at all. Managers should only have zones at sites where they find that it reduces the complexity of management and makes the task of managing easier. A system of zones can also be used to inform all involved parties about management aims.

Buffer zones

Often there is a need to protect the site from damaging factors originating outside the site. This can lead to the setting up of buffer zones around the most vulnerable parts of the site. In buffer zones, control of activities is usually exercised indirectly, by management agreements or framing laws. If a buffer zone around a site is not possible, part of the site itself may be used as a buffer for the most fragile parts of the site.

Where to find further information

Eurosite Management Planning Toolkit, 1999 and Complementary Guidance, 2004. Can be downloaded form **http://www.eurosite-nature.org/article.php3?id_article=77**

Biosphere Reserve zonation concept

The concept of zoning Biosphere Reserves, adopted by UNESCO's Man and the Biosphere (MAB) Programme, in which the site may include up to three zones, core zone, buffer zone (for research and training) and transition zone (for sustainable use) is potentially applicable to all Ramsar sites and other wetlands, and should be applied whenever feasible and appropriate.

The core area which needs to be legally established for giving long-term protection to the landscape, ecosystem and species it contains**,** should be sufficiently large to meet these conservation objectives. There may be several core areas in a single Biosphere Reserve to ensure a representative coverage of the mosaic of ecological systems. Normally, the core area is not subject to human activity, except research and monitoring and, in some cases, for traditional uses by local communities.

A buffer zone (or zones) which is clearly delineated and which surrounds, or is contiguous to, the core area. Activities are organized here so that they do not hinder the conservation objectives of the core area but rather help to protect it. It can be an area for experimental research, for example to discover ways to manage natural vegetation, croplands, forests, fisheries and to enhance high quality production while conserving natural processes and biodiversity, including soil resources, to the maximum extent possible. In a similar manner, experiments can be carried out in the buffer zone to explore how to rehabilitate degraded areas.

An outer transition zone, or area of cooperation extending outwards, which may contain a variety of agricultural activities, other human activities and human settlements. It is here that the local communities, conservation agencies, scientists, civil associations, cultural groups, private enterprises and other stakeholders must agree to work together to manage and sustainably develop the area's resources for the benefit of the people who live there. The transition area is of great economic and social significance for regional development. Although presented schematically as a series of concentric rings, the three zones are usually implemented in many different ways to accommodate local geographic conditions and constraints. This flexibility allows for creativity and adaptability, and is one of the greatest strengths of the concept.

The experience of the Man and the Biosphere Programme (MAB), under which zonation is recognized as an important part of the delimitation and management of Biosphere Reserves as multiple use sites, is that zonation plays an important role in minimizing user conflicts by separating potentially conflicting activities, while ensuring that legitimate land uses can continue with minimal conflict.

A Ramsar/MAB joint Web site (**http://www.unesco.org/mab/BRs/brs_ramsar.shtml**) was launched in February 2001, providing information on the 85 Ramsar Sites and 74 Biosphere Reserves in 43 countries. A joint work programme established in 2001 recognizes the mutual interest in the activities of the Ramsar Convention and MAB particularly in the areas of identification and designation of sites, site management planning, assessment and monitoring, and communication, education and public awareness.

Source: Managing wetlands. Ramsar Handbook No. 16, 3rd edition, 2007.

Putting together the management plan

The integration of all of the above planning elements into a single document will result in a management plan for your wetland. The format of the management plan should comprise five main sections, reflecting the main steps in the management planning process:

a. Preamble/ policy

b. Description

c. Evaluation

d. Objectives

e. Action plan for each of the objectives

(Managing wetlands. Ramsar Handbook No. 16, 3rd edition, 2007).

Remember that the management plan should be about increasing awareness, understanding, engagement and commitment to act collectively to conserve the wetland.

Translating plan to projects on the ground

The final stage of management plan preparation requires preparation of specific management projects to describe in detail all the activities that will be associated with each of the features, based on those strategies considered most appropriate to safeguard each feature. The management projects should essentially highlight the following:

When	when the work will be carried out and for how long
Where	where on the site activities will it take place
Who	who will do the work and how much time will be required
Priority	what priority is given to the project
Expenditure	how much the work will cost

Once the management projects have been developed, for operational purposes it will be appropriate to compile the suite of management projects into an annual operational plan, which is designed to guide, and assist in monitoring the implementation of the overall site plan.

8. Closing the planning loop

Once the management plan and associated projects are being implemented, it is time to monitor and review the progress toward achieving the objectives. This feedback loop helps to review the impacts of management, to identify whether the plan is being implemented and the objectives are being met, and to adapt and adjust management actions accordingly. If implementation is faced with problems, monitoring and review proves to be helpful and is used to re-deploy resources and effort to improve implementation.

Monitor

Monitoring can be focussed on two different things: the 'ecological character' (see definition in Section 5) or the environmental 'outcomes' of managing a site, (for example, what percentage of a site is occupied by invasive plants); and/or the 'outputs' of the management interventions, (for example, were the specified number of hectares of weed sprayed with herbicide and killed in this year).

Monitoring intelligently

While drawing up the monitoring plan, try to identify secondary sources, for example, government agencies/ universities/ongoing research projects which are already collecting the data that you require. This will reduce the costs of monitoring.

Frequency of monitoring should be based on the fragility/vulnerability of the ecological feature you are monitoring.

Outputs are short term surrogates for how well a site is being managed, **Outcomes** are longer term (more than three years) measures of the actual wetland environment we are trying to conserve. A good management plan should make provision for monitoring both types of results. This is particularly important in the context of the Ramsar Convention and its Contracting Parties. For example in Australia, 'ecological character' has become a scientific-legal term in law as a trigger for certain types of decisions, such as, should a development be allowed to proceed which may 'significantly' impact upon the 'ecological character' of a Ramsar-listed wetland.

The concept and importance of monitoring both 'outputs' and 'outcomes' becomes clearer with this example. A floodplain wetland may be designated as a Ramsar site because of its mosaic of flooded forests, grasslands and reedbeds, these collectively supporting a large and diverse waterbird and fish community. These plant and animal communities may be part of what defines the ecological character of this site. An indicator for monitoring the condition of the site is that the extent of each plant community remains substantially the same. If large areas of the floodplain forest die from lack of natural flooding, then no matter what other planned management activities have taken place, (weed control, visitor services, fire management), the management has failed against one of its prime objectives- maintaining the forest part of the 'ecological character' for which the site was designated. Consequently, in this case, monitoring that shows the failed outcome should be used to revise the plan to refocus on the main problems, in this case, provision of adequate environmental flows.

It is thus important that for both 'outputs' and 'outcomes' a list of performance indicators, linked to the objectives, be prepared as part of the management plan before the work starts, so that at the time of review, progress towards achieving the objectives can be ascertained. Performance indicators, and setting their specific limits, has already been discussed in Section 6. These indicators should be monitored on a regular basis as agreed upon in the plan.

Outcome indicators should be based on the 'ecological character' and special features of a site, such as populations of threatened species (as discussed in Section 6). Indicators should be selected that can be readily measured in the same way at yearly or longer intervals. In order to reduce the cost of monitoring and increase the chance that you and your successors can repeat the monitoring, the indicators should be chosen carefully. For example, it may not be affordable or practical to assess population sizes of all significant species in a wetland system. Consequently it may be most cost-effective to assess population trends of a top predator, like crocodiles, or of species particularly sensitive to environmental change, such as a fish species that depend on particular water quality to thrive. Another important indicator that may be easily used is the presence, population density and/or extent of invasive species - have new invasive species appeared, or have existing infestations spread? The extent of particular habitat types that can be readily checked by aerial or satellite images is another possible way of measuring such system attributes.

Output indicators should focus on key data that you, or other reserve managers and users, may need to readily collect and relate to key management objectives and users. These indicators may include those related to management interventions in comparison with the scale of the problem. Examples include the number of poachers caught, compared to populations of their target species, the area or population of invasive species effectively controlled, the volume of fish landed by local anglers (as recorded by fisheries agencies), or timing and area of floodplain flooded by planned environmental flows.

An integrated management planning process for a Ramsar site or other wetlands must clearly define:

- monitoring requirements for detecting changes, not only in ecological character, socio-economic and cultural features, but also in the factors that influence, or may influence these features; and
- a process of review and/or audit for measuring the effectiveness of management.

(Based on Ramsar Resolution VIII.14)

Monitoring is an integral part of each objective set out for site management. It helps the manager to demonstrate that management is effective and efficient, and if not, guides the manager to take corrective measures before it is too late.

Wetland managers need therefore carefully to select a portfolio of indicators best suited to the objectives of managing your wetland. The crucial information generated through the monitoring plan will provide inputs for reviews and audits. Even a well-designed monitoring program can have little value if the information that is collected is not utilized, or does not influence the management process for that locality or site (Finlayson & Mitchell 1999).

Where to find further information

Finlayson, C.M. & Mitchell, D.S. 1999. Australian wetlands: the monitoring challenge. Wetlands Ecology and Management, Volume 7, Number 1, June 1999 , pp. 105-112(8), Springer
http://www.epa.gov/owow/wetlands/pdf/techfram_pr.pdf

Review and adjust

Effective management of wetland areas is an investment for people and biodiversity. It is important to review the management plan on a regular basis so that progress towards achieving the objectives can be tracked whether or not they are being achieved efficiently and effectively. Reviews are thus critical for learning, adapting and improving management actions; the fundamentals of adaptive management.

Annual or short-term reviews

A short-term review should be made to confirm that a site is being managed in accordance with the requirements of the plan. Data from monitoring is critical for the review. An advantage of annual review (or more frequently if warranted) is that it assists forward planning for the following year (or period), so that incomplete projects can be added and tasks given a new time-frame in the light of experience.

Major review or audit

Major reviews or audits should be considered as an essential component of any planning process. The function of audit is to:

i. assess whether or not a site is being managed to the required standard;

ii. confirm, as far as possible, that the management is effective and efficient; and

iii. ensure that the status of the site features is being accurately assessed.

The audit process is best carried out by an independent expert, although this is not always necessary. It is a constructive process which should identify any problems or concerns and seek to provide recommendations for resolving any issues.

IUCN's World Commission on Protected areas (WCPA) has developed a 'framework' for an assessment of management effectiveness. It focuses on two aspects:

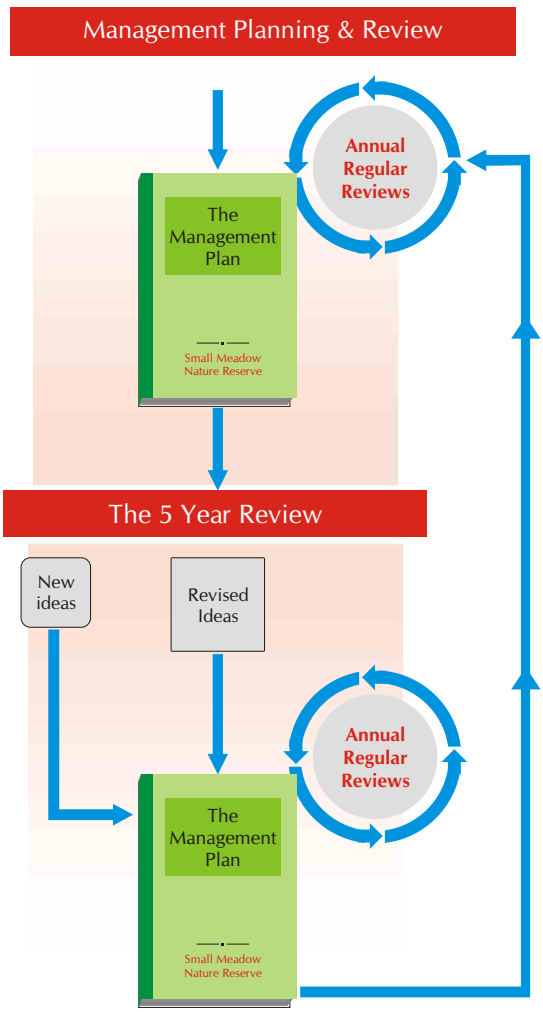
- The appropriateness of management systems and processes measured by assessing the management inputs required and the processes used.
- The delivery of protected area objectives measured by identifying the outputs and outcomes of management.

Within this broad division, there are six main elements of the management process which can be evaluated to identify the level and location of success or failure within the management cycle:

- Where are we now? (context)
- Where do we want to be? (planning)
- What do we need? (input)
- How do we go about it? (process)
- What were the results? (outputs, i.e. the activities carried out or services provided)
- What did we achieve? (outcomes, i.e. the actual achievements of management)

Source: Hocking, M., Stolton, S. & Dudley, N. 2000. Evaluating Effectiveness : Framework for assessing the management of Protected areas, IUCN, Gland Switzerland and Cambridge UK.

Using the WCPA framework, WWF has developed a **Management Effectiveness Tracking Tool** (METT or Tracking Tool) to help track and monitor progress in the achievement of the World Bank/WWF Alliance worldwide protected area management effectiveness target. The 2nd edition is out and available for download at **http://www.panda.org/parkassessment**. This version allows the Tracking Tool to be more readily applied to all terrestrial protected areas through, in particular, more reference to wetland protected areas. The use of this integrated Tracking Tool can help managers track progress in implementing protected areas commitments under the Convention on Biological Diversity and the Ramsar Convention on Wetlands. A variation of the Tracking Tool has also been developed by the World Bank for use in Marine Protected Areas and can be downloaded from **http://www.icriforum.org/mpa/SC2_eng_nocover.pdf**



Reviews and audits are usually carried out in accordance with a predetermined timetable. The interval between reviews will be a reflection of the confidence that managers have in their ability to protect the features of the site. For sites with robust features which are easily managed, the interval may be five years or more. However, for fragile sites, where threats are not readily controlled, the interval should be much shorter.

On all sites, reviews should be undertaken at any time if new or unforeseen threats become apparent. It is essential that the timing of the review process be adjusted to meet the requirements of the site.

For Ramsar-listed sites which have been included in the Montreux Record because of recognized threats to their ecological character, a Ramsar Advisory Mission can be regarded as one form of review and/or audit.

Information on the Montreux Record and Ramsar Advisory Missions is available in The Ramsar Convention Manual: A Guide to the Convention on Wetlands, 4th Edition, 2006), available from the Ramsar Secretariat in hard copy and on CD-ROM or can be downloaded from the Ramsar Web site at **http://www.ramsar.org/lib/lib_manual2006e.htm**

Fig. 2. The 'Review' cycle
Source: Eurosite Management Planning Toolkit, 1999

Fivebough and Tuckerbill Swamps
Ramsar site, New South Wales, Australia

Fivebough Swamp is 400 ha of the 689 ha Ramsar site. The swamp was once full of trees, a relic lake depression that was greatly degraded by excessive flooding, fire and clearing. Heavy grazing led to much of the wetland becoming an open mud flat and a prime habitat for migratory waterbirds, while another section where grazing had ceased to became dense reeds and habitat for rare waterbird species. This public land was leased by the state (provincial government) for grazing and to the local government for sewage treatment. The swamp is surrounded by extensive irrigation farm developments so that water management is now highly regulated.

Fivebough Swamp was proposed for permanent flooding to become a recreational lake. Community environment groups campaigned successfully against this development and for the swamp to be managed for conservation, especially of the nearly 90 waterbird species using the wetland. This led to the designation of the wetland as a Ramsar site in 2002.

A comprehensive management plan was essential for this site for two reasons:

The conservation values of the site could only be maintained through active and complex human intervention, for example, using a spectrum of stock grazing rates to keep different parts of the site suitable for different feeding guilds of waterbirds ; and

The large number of government agencies, businesses and community groups with an active interest in the Swamp meant that a common view of the goals and activities for managing the site had to be extensively discussed and agreed.

In 1998 the local community formed the 'Fivebough and Tuckerbil Wetlands Management Trust Inc.' with members from community groups, the irrigation industry, and local and state government agencies. Additional observers also participated from the federal government, the indigenous community and a university. The Trust (with the help of a commissioned expert) prepared and agreed on a management plan in February 2002 covering all the complex site-management issues. The Trust's work has helped it gain a number of government grants and access to employment programs to rehabilitate the wetland and establish visitor facilities.

Contributed by : Jamie Pittock, WWF
Management plan : **http://www.fivebough.org.au/**
Ramsar site no. 1224 : **http://www.wetlands.org/rsis/**

Case Study 2

The Wadden Sea: a long-lasting struggle towards transboundary wetland management

The Wadden Sea is a shallow area extending along the North Sea coasts of the Netherlands, Germany and Denmark. It is a highly dynamic ecosystem with tidal channels, sands, mud flats, salt marshes, beaches, dunes, river mouths and a transition zone to the North Sea; the offshore zone.

Since 1978, the Netherlands, Denmark and Germany have been working together on the protection and conservation of the Wadden Sea; covering management, monitoring and research, as well as political matters. The area of the trilateral cooperation for these governments, the so-called Cooperation Area, is 13,500 km2.

In 1982, a Joint Declaration on the Protection of the Wadden Sea was agreed to, in which the countries declared their intention to coordinate their activities and measures for the protection of the Wadden Sea.

After 20 years of trilateral cooperation the first full common management plan was published: The Trilateral Wadden Sea Plan (WSP) was adopted at the Eighth Trilateral Governmental Conference in Stade in October 1997. The WSP entails joint efforts of the three countries in the matter of common policies, measures, projects and actions to fulfil the ecological targets.

The step-by-step development of the trilateral cooperation towards a common management plan is illustrated by these major milestones:

1978:	Decision to strengthen the cooperation on the protection of the Wadden Sea.
1980:	Coordination of scientific research.
1982:	Adoption of the Joint Declaration.
1985:	Decision to establish a common secretariat.
1988:	Adoption of the Agreement on the Protection of Seals.
1991:	Adoption of the guiding principle, common management principles and objectives for human use.
1994:	Adoption of a common delimitation and common ecological targets.
1997:	Adoption of a Trilateral Wadden Sea Plan and a common package of monitoring parameters.
2001:	Adoption of a Wadden Sea Forum, adoption of a new Seal Management Plan, demarcation of the boundaries of the Wadden Sea Area and Conservation Area.
2005:	10th Trilateral Ministerial Wadden Sea Conference.

The case of the Wadden Sea clearly shows that establishing transboundary wetland management is a step-by-step process that needs patience, development of common targets, monitoring and research. The cooperation will only be successful if there are clear benefits for all parties involved.

Contributed by : Frank Alberts, RIZA
More information : **http://www.waddensea-secretariat.org**
Ramsar sites : there are 11 Ramsar sites covering large parts of the Danish, German and Dutch Wadden Sea **http://www.wetlands.org/rsis/**

Case Study 3

Mai Po Inner Deep Bay Ramsar site, Hong Kong, People's Republic of China

The north-western corner of the Hong Kong Special Administrative Region (SAR) is separated from mainland China by Deep Bay, a relatively shallow bay (maximum depth < 3 m) that is surrounded by a mosaic of wetland habitats. For many generations, these wetlands have provided a livelihood for people farming oysters, shrimps, fish and other wetland products, as well as habitats for wildlife, particularly migratory waterbirds.

The central part of this wetland is the Mai Po Marshes, an area made up by 24 traditionally operated commercial shrimp ponds (locally called gei wai) that were created in the mid-1940s but which were also important as a staging post for migratory waterbirds.

In order to protect Mai Po and the surrounding wetlands, the Hong Kong Government declared the Mai Po Site of Special Scientific Interest (SSSI) in 1976, and listed the Mai Po Inner Deep Bay, a Ramsar site in 1995. However, despite the designation as a Ramsar site, the area continued to be degraded, especially due to commercial activities. With the aim of establishing the area for conservation and for promoting wetland education, WWF-Hong Kong, with financial assistance from the Hong Kong Government, assumed management control of the whole area in 1995.

WWF-Hong Kong drafted habitat management plans for the Mai Po Nature Reserve (MPNR) for the periods 1994-99, 1999-2003 and 2004-08. These plans set the overall habitat management objectives for the MPNR and list the necessary prescriptions in order to achieve those objectives, along with a timetable for doing so.

Following the listing of the Mai Po Inner Deep Bay, as a Ramsar site in 1995, the Hong Kong Government produced a management plan for the site in 1997. This plan set the broad framework for the conservation of the Ramsar area (including the MPNR), and divided the site into five management zones (Core Zone, Biodiversity Management Zone, Wise-use Zone, Public Access Zone and Private Land Zone), each with its own management objective. The Government-developed plans and those prepared by WWF compliment each other. The former sets the policy framework for the overall site, whilst the latter gave the details for practical measures to be carried out in conserving one part of the Ramsar site (the MPNR).

Progress with implementation of the five-year management of the wetland habitats at MPNR is reviewed at regular intervals by the Mai Po Management Committee. It meets regularly and has members from government, other NGOs, as well as relevant wetland experts and stakeholders. This committee is also responsible for approving the MPNR habitat management plan. Progress with implementation of the management plan is subject to regular reviews of the plan allow opportunities for any problems to be highlighted and committee members, or staff, to proffer solutions to these problems; thus resulting in the improved management of the site.

This flexible and adaptive approach to management of the MPNR has contributed to the improved management of the reserve for wildlife and visitors. Apart from leading to greater security for the biodiversity within the MPNR, improved site management also has a number of other benefits. For example, potential sponsors will be able to see that any money they donate to the reserve will be spent effectively.

Contributed by : Lew Young, Mai Po Nature Reserve, WWF Hong Kong.
More information : **http://www.wwf.org.hk/eng/maipo/**
Ramsar site no. 750 : Mai Po Marshes & Inner Deep Bay **http://www.wetlands.org/rsis/**

Stakeholder involvement in the Inner Niger Delta, Mali

Case Study 4

The Niger River is one of the longest rivers in Africa, originating in the rainforest of Guinea where the annual rainfall is 2,500 mm per year. From there the river runs north-west to form, in the centre of Mali bordering the Sahara desert, a labyrinth of waterways and floodplains called the Inner Niger Delta (IND); the second largest riverine floodplain in Africa (after the Okavango floodplain in Botswana). Since the area is situated at the edge of the Sahara, where local rainfall is very limited, its flooding is fully dependant on the supply of the river. Due to annual variation in rainfall in the catchment area and river discharge, the total inundated area varies between 10,000 and 45,000 km2.

On the banks of the Niger River have stood some of the greatest civilizations of antiquity and historically important cities such as Timbuktu and Djenné - ancient centres of knowledge, culture and trade. Today, about 100,000 tourists visit the area, and its surroundings generate an annual income of about 1,5 million Euros. The area is inhabited by approximately one million people who are dependent on its natural resources as fishermen, cattle breeders or farmers. The total production of rice, fish and cattle contributes approximately 15% to the Gross National Product of Mali. Fish production amounts to 100,000 tons/year but is now declining because of the recurrent droughts, increasing number of fishermen and use of inappropriate fishing techniques. The IND is also known as an area of high biodiversity, especially because it is an important resting area for migratory waterbirds that spend the northern winter in West Africa. Other important biodiversity features include manatees, hippopotamuses, and the Black Crowned Crane in Balearica pavonine.

During and after the last droughts (1973, 1984) the IND has faced many threats, among which are climatic factors, reduction in the flooded area and the duration of flooding, sedimentation and human factors (flooded forests removed to make way for agricultural land, overexploitation of fauna and flora). As a result local community incomes and biodiversity values in the area have severely declined.

The social structure and relationships between different ethnic groups is highly complex and forms the basis for access to, and management of, natural resources such as waterways, forests and agricultural land. For centuries the IND has been managed by the Fulani Emperor according to a system of laws known as the dina. It has divided the IND into agricultural (free access), agro-pastoral and fishing lands (limited access). Under French colonization, and since its independence, there have been some transformations in the traditional management system, but it still exists in a less rigid way.

To undertake and facilitate the development of local wetland management plans for hotspots of biodiversity (for instance, the flooded forests and Echinochloa stagnina pastures) a socio-economic survey was carried out in 28 villages in the IND. For a management plan to be effective, it must take into consideration the traditional arrangements that exist within and between the different stakeholders.

The stakeholder analysis showed that in most of the villages, traditional systems continue to be in place for the management of natural resources. The most respected and powerful socio-economic organization in each village is the village chief and his advisors. This structure is the bridge and negotiator between all stakeholders and plays a major role in conflict resolution. There is also a traditional chief, who watches over traditions and the morals of the community. This person plays a major role in managing the village's natural resources.

Other major socio-economic organizations consist of men's and women's groups (only a few are mixed) which are focused on a certain activities (for instance fisheries or agriculture). Some of these organizations (especially women's groups) play an important role in natural resource management, through prohibiting the cutting of firewood, planting of trees, etc. The main role of these organizations is to contribute to the development of the village, and to look after dispossessed persons.

Other important stakeholders that intervene in the different villages are technical and administrative state agencies. The Nature Conservation, Rural Extension and Fisheries Agency is the organization responsible for natural resource management. Several NGOs and international institutions also intervene in many villages, some of which support the implementation of natural resource management activities.

Using the Participatory Rural Appraisal tools such as 'land use mapping', an inventory of the natural resources was carried out in each village by the villagers themselves. This activity had four objectives:

1. Collect information from the villagers related to the exploitation of natural resources in their village and the socio-economic importance of these resources.
2. Identify, with the population, the potential for and constraints on exploitation of their land.
3. Identify existing and possible solutions for the management of the selected sites.
4. Identify all stakeholders involved in land management in and around the village.

In each village, a focus group was created of members of the main socio-economic organizations. This was responsible for drawing maps of the village, the natural resources surrounding it and analysing the opportunities and constraints.

The analysis helped the local communities to identify their resources, constraints and possible solutions. The focus group that was created for the analysis continued to function as a natural resource management team, responsible for the development of the management and action plans. The analysis forms the basis for Wetlands International and other NGOs (such as IUCN and the Near East Foundation) to support the communities with the development and implementation of natural resource management plans. No activities are carried out in villages where the management committee is not able to come to a full agreement on the resources and areas to be managed under the plan.

One of the most successful activities so far has been the restoration of two flooded forests by the IUCN. This activity is now being replicated in the other communities in the IND by other organizations. The restoration of the flooded forest is always accompanied by the implementation of other revenue generating activities which were indicated by the community. These activities included the restoration of local pastures (*Echinichloa stagnina*), vegetable growing and the development of a local fund, managed by the community, which can be used to finance activities.

The different management plans were formalized using a 'local convention'. This local convention is recognized by the Mali Government as a tool for natural resource management in the community. The convention is developed and signed by the stakeholders and it helps govern access to natural resources and can be used to settle disputes among resource users.

Where possible, solutions proposed by the local communities can be checked using satellite image analysis; this is especially effective for restoration activities. Using this technique, the most successful sites for restoration activities can be selected and former borders of, for instance, a flooded forest, established.

A stakeholder analysis is an indispensable tool to ensure that management activities fit local customs and traditional management structures. In the case of the IND, the stakeholder analysis was used to get local communities to identify the opportunities and constraints, and also identify all stakeholders who should be involved in the management of natural resources. The following management plans and activities were carried out with the full consent of all stakeholders and laid down in the local

conventions. In areas where complicated social structures exist, such as in the IND, a stakeholder analysis can identify existing problems between stakeholders at an early stage, so they can be dealt with immediately without frustrating the implementation of a management plan later on.

Further information:

Bagayoko, S., Sangaré, L. & Traoré, O. 2001. Vers un aménagement et une gestion durable des ressources naturelles dans les zones humides du Delta Intérieur du Niger à partir de la cartographie paysanne du terroir villageois. Résultats de recherche d'un diagnostic réalisé dans les 28 villages de Wetlands International Sévaré (Mali). Wetlands International, Sévaré, Mali.

Kone, B. 2001. Organisations Socio-économiques dans les villages partenaires de Wetlands International dans le Delta Intérieure de Niger (Mali). Mali-PIN Publication 00-02. Wetlands International, Sévaré (Mali)/Altenburg & Wymenga, Veenwoude (The Netherlands).

Wymenga, E., Kone, B., van der Kamp, J. & Zwarts, L. 2002. Delta Intérieur de Niger. Ecologie et gestion durable des ressources naturelles. Mali-PIN Publication 2002-01. Wetlands International, Sévaré / RIZA, Rijkswaterstaat, Lelystad/Altenburg & Wymenga conseillers écologiques, Veenwouden.

Contributed by : Pieter Terpstra & Bakary Kone, Wetlands International
Ramsar site no. 1365 : Delta Intérieur du Niger **http://www.wetlands.org/rsis/**

Information Sheet on Ramsar Wetlands (RIS)

2006-2008 version

Along with Explanatory Notes and Guidelines can be downloaded from http://www.ramsar.org/ris/key_ris_index.htm.

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

Notes for compilers:

1. The RIS should be completed in accordance with the attached Explanatory Notes and Guidelines for completing the Information Sheet on Ramsar Wetlands. Compilers are strongly advised to read this guidance before filling in the RIS.

2. Further information and guidance in support of Ramsar site designations are provided in the Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance (Ramsar Wise Use Handbook 7, 2nd edition, as amended by COP9 Resolution IX.1 Annex B). A 3rd edition of the Handbook, incorporating these amendments, is in preparation and will be available in 2006.

3. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers should provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of all maps.

For office use only.

DD	MM	YY						

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

2. Date this sheet was completed/updated:

3. Country:

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

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

This RIS is for (tick one box only):
a) Designation of a new Ramsar site ☐ ; or
b) Updated information on an existing Ramsar site

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

a) Site boundary and area

The Ramsar site boundary and site area are unchanged: ☐
or

If the site boundary has changed:

i) the boundary has been delineated more accurately ☐ ; or

ii) the boundary has been extended ☐ ; or

iii) the boundary has been restricted** ☐

and/or

If the site area has changed:

i) the area has been measured more accurately ☐ ; or

ii) the area has been extended ☐ ; or

iii) the area has been reduced** ☐

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

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

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

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

i) a hard copy (required for inclusion of site in the Ramsar List): ☐ ;

ii) an electronic format (e.g. a JPEG or ArcView image) ☐ ;

iii) a GIS file providing geo-referenced site boundary vectors and attribute tables . ☐

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

8. Geographical coordinates (latitude/longitude, in degrees and minutes):
Provide the coordinates of the approximate centre of the site and/or the limits of the site. If the site is composed of more than one separate area, provide coordinates for each of these areas.

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

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

11. Area: (in hectares)

12. General overview of the site:
Provide a short paragraph giving a summary description of the principal ecological characteristics and importance of the wetland.

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

1	2	3	4	5	6	7	8	9
☐	☐	☐	☐	☐	☐	☐	☐	☐

14. Justification for the application of each Criterion listed in 13 above:
Provide justification for each Criterion in turn, clearly identifying to which Criterion the justification applies (see Annex II for guidance on acceptable forms of justification).

15. Biogeography (required when Criteria 1 and/or 3 and /or certain applications of Criterion 2 are applied to the designation):
Name the relevant biogeographic region that includes the Ramsar site, and identify the biogeographic regionalisation system that has been applied.

a) biogeographic region:

b) biogeographic regionalisation scheme (include reference citation):

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

17. Physical features of the catchment area:
Describe the surface area, general geology and geomorphological features, general soil types, and climate (including climate type).

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

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

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

Inland: L • M • N • O • P • Q • R • Sp • Ss • Tp • Ts • U • Va

Vt • W • Xf • Xp • Y • Zg • Zk(b)

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

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

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

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

22. Noteworthy fauna:
Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in 12. Justification for the application of the Criteria) indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc., including count data. Do not include here taxonomic lists of species present these may be supplied as supplementary information to the RIS.

23. Social and cultural values:

a) Describe if the site has any general social and/or cultural values e.g., fisheries production, forestry, religious importance, archaeological sites, social relations with the wetland, etc. Distinguish between historical/archaeological/religious significance and current socio-economic values:

b) Is the site considered of international importance for holding, in addition to relevant ecological values, examples of significant cultural values, whether material or non-material, linked to its origin, conservation and/or ecological functioning?

If Yes, tick the box ☐ and describe this importance under one or more of the following categories:

i) sites which provide a model of wetland wise use, demonstrating the application of traditional knowledge and methods of management and use that maintain the ecological character of the wetland:

ii) sites which have exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland:

iii) sites where the ecological character of the wetland depends on the interaction with local communities or indigenous peoples:

iv) sites where relevant non-material values such as sacred sites are present and their existence is strongly linked with the maintenance of the ecological character of the wetland:

24. Land tenure/ownership:
a) within the Ramsar site:

b) in the surrounding area:

25. Current land (including water) use:
a) within the Ramsar site:

b) in the surroundings/catchment:

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

b) in the surrounding area:

27. Conservation measures taken:
a) List national and/or international category and legal status of protected areas, including boundary relationships with the Ramsar site:
In particular, if the site is partly or wholly a World Heritage Site and/or a UNESCO Biosphere Reserve, please give the names of the site under these designations.

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

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

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

d) Describe any other current management practices:

28. Conservation measures proposed but not yet implemented:
e.g. management plan in preparation; official proposal as a legally protected area, etc.

29. Current scientific research and facilities:
e.g., details of current research projects, including biodiversity monitoring; existence of a field research station, etc.

30. Current communications, education and public awareness (CEPA) activities related to or benefiting the site:
e.g. visitors' centre, observation hides and nature trails, information booklets, facilities for school visits, etc.

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

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

33. Management authority:
Provide the name and address of the local office(s) of the agency(ies) or organisation(s) directly responsible for managing the wetland. Wherever possible provide also the title and/or name of the person or persons in this office with responsibility for the wetland.

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

Please return to: Ramsar Convention Secretariat, Rue Mauverney 28, CH-1196 Gland, Switzerland
Telephone: +41 22 999 0170 Fax: +41 22 999 0169 **e-mail: ramsar@ramsar.org**

Suggested (but not exhaustive) list of wetland features and functions to assist in preparing a wetland site description

Biophysical features

- Site name (official name of site and catchment)
- Area and boundary (size and variation, range and average values) *
- Location (projection system, map coordinates, map centroid, elevation) *
- Geomorphic setting (where it occurs within the landscape, linkage with other aquatic habitat, biogeographical region) *
- General description (shape, cross-section and plan view)
- Climate zone and major features
- Soil (structure and colour)
- Water regime (periodicity, extent of flooding and depth, source of surface water and links with groundwater)
- Water chemistry (salinity, pH, colour, transparency, nutrients)
- Biota (vegetation zones and structure, animal populations and distribution, special features including rare/endangered species)

Management features

- Land use local, and in the river basin and/or coastal zone
- Pressures on the wetland within the wetland and in the river basin and/or coastal zone
- Land tenure and administrative authority for the wetland, and for critical parts of the river basin and/or coastal zone
- Conservation and management status of the wetland including legal instruments and social or cultural traditions that influence the management of the wetland
- Ecosystem values and benefits (goods and services) derived from the wetland including products, functions and attributes (see Resolution VI.1) and, where possible, their services to human well-being (see Resolutions VI.23 and VII.8)
- Management plans and monitoring programs in place and planned within the wetland and in the river basin and/or coastal zone (see Resolutions 5.7, VI.1, VII.17, and VIII.14)

* These features can usually be derived from topographical maps or remotely sensed images, especially aerial photographs.

Source: Ramsar Resolution VIII.6. For further information see Ramsar Handbook 12, Wetland inventory. 3rd edition, 2007.

Appendix B

The wetland description should also focus on including information on any particular local features or characteristics of the site, especially its values and functions for people that may be helpful in establishing priorities and setting management objectives. These are essentially functions that are directly (flora and fauna) or indirectly (services provided by ecosystems) derived from the wetland. Since most of these functions are of great socio-economic importance, involving the relevant stakeholders and their inputs in this characterisation is essential. An indicative list is provided below:

Production functions

- Timber production
- Firewood production
- Production of harvestable grasses (construction & artisanal use)
- Naturally produced fodder & manure
- Harvestable peat
- Secondary (minor) products
- Harvestable bush meat (food)
- Fish and shellfish productivity
- Construction and artisan use
- Drinking water supply
- Supply of water for irrigation and industry
- Water supply for hydroelectricity
- Supply of surface water for other landscapes
- Supply of ground water for other landscapes
- Crop productivity
- Tree plantations productivity
- Managed forest productivity
- Rangeland /livestock productivity
- Aquaculture productivity (freshwater)
- Mariculture productivity (brackish/saltwater)

Carrying functions suitability for:

- Constructions
- Indigenous settlement
- Rural settlement
- Urban settlement
- Industry
- Infrastructure
- Transport infrastructure
- Shipping / navigation
- Road transport
- Rail transport
- Air transport
- Power distribution
- Use of pipelines
- Leisure and tourism activities
- Processing and regulation functions
- Decomposition of organic material (land-based)
- Natural desalinisation of soils
- Development / prevention of acid sulphate soils

- Biological control mechanisms
- Seasonal cleansing of soils
- Soil water storage capacity
- Coastal protection against floods
- Coastal stabilisation (against accretion / erosion)
- Soil protection
- Water filtering
- Dilution of pollutants
- Discharge of pollutants
- Bio-chemical/physical purification of water
- Storage for pollutants
- Flow regulation for flood control
- River base flow regulation
- Water storage capacity
- Ground water recharge capacity
- Regulation of water balance
- Sedimentation / retention capacity
- Protection against water erosion
- Protection against wave action
- Prevention of saline groundwater intrusion
- Prevention of saline surface-water intrusion
- Transmission of diseases
- Carbon sequestration
- Maintenance of pollinator services

Source: Managing wetlands. Ramsar Handbook No. 16, 3rd edition, 2006; see also Ramsar Resolution VIII.9.

In the case of sites where there are significant anthropogenic features with historical, cultural or religious value, these should also be safeguarded through the management planning process. An indicative list of cultural features of wetlands is provided below:

Cultural features

- Palaeontological and archaeological records;
- Historic buildings and artefacts;
- Cultural landscapes;
- Traditional production and agro-ecosystems, e.g. ricefields, salinas, exploited estuaries;
- Collective water and land management practices;
- Self-management practices, including customary rights and tenure;
- Traditional techniques for exploiting wetland resources;
- Oral traditions;
- Traditional knowledge;
- Religious aspects, beliefs and mythology;
- "The arts" music, song, dance, painting, literature and cinema.

Source: Ramsar Resolution VIII.19.

WWF - Canon / Sandra Mbanefo Obiago

A lone fisherman paddles homewards on Lake Malawi, Malawi.

Relative magnitude (per unit area) of ecosystem services derived from different types of wetland ecosystem

Scale is low •, medium ●, to high: ⬤ ; not known = **?**; blank cells indicate that the service is not considered applicable to the wetland type. The information in the table represents expert opinion for a global average pattern for wetlands; there will be local and regional differences in relative magnitudes.

Services	Comments and Examples	Permanent and Temporary Rivers and Streams	Permanent Lakes, Reservoirs	Seasonal Lakes, Marshes, and Swamps, Including Floodplains	Forested Wetlands, Marshes, and Swamps, Including Floodplains	Alpine and Tundra Wetlands	Springs and Oases	Geothermal Wetlands	Underground Wetlands, Including Caves and Groundwater Systems
Inland Wetlands									
Provisioning									
Food	production of fish, wild game, fruits, grains, and so on	⬤	⬤	⬤	⬤	•	•		
Fresh water	storage and retention of water; provision of water for irrigation and for drinking	⬤	⬤	●	•	•	•		⬤
Fiber and fuel	production of timber, fuelwood, peat, fodder, aggregates	●	●	•	⬤	●	•		
Biochemical products	extraction of materials from biota	•	•	?	?	?	?	?	?
Genetic materials	medicine; genes for resistance to plant pathogens, ornamental species, and so on	•	•	?	•	?	?	?	?
Regulating									
Climate regulation	regulation of greenhouse gases, temperature, precipitation, and other climatic processes; chemical composition of the atmosphere	•	⬤	•	⬤	•		•	•
Hydrological regimes	groundwater recharge and discharge; storage of water for agriculture or industry	⬤	⬤	●	●	•	•		•
Pollution control and detoxification	retention, recovery, and removal of excess nutrients and pollutants	⬤	●	•	●	•	•		●
Erosion protection	retention of soils and prevention of structural change (such as coastal erosion, bank slumping, and so on)	●	•	•	●	?	•		•
Natural hazards	flood control; storm protection	●	⬤	⬤	●	●	•		•
Cultural									
Spiritual and inspirational	personal feelings and well-being; religious significance	⬤	⬤	●	●	•	⬤	•	•
Recreational	opportunities for tourism and recreational activities	⬤	⬤	●	•	•	•	•	•
Aesthetic	appreciation of natural features	⬤	●	•	●	•	•	•	•

Scale is low•, medium ●, to high: ⬤ ; not known = ?; blank cells indicate that the service is not considered applicable to the wetland type. The information in the table represents expert opinion for a global average pattern for wetlands; there will be local and regional differences in relative magnitudes.

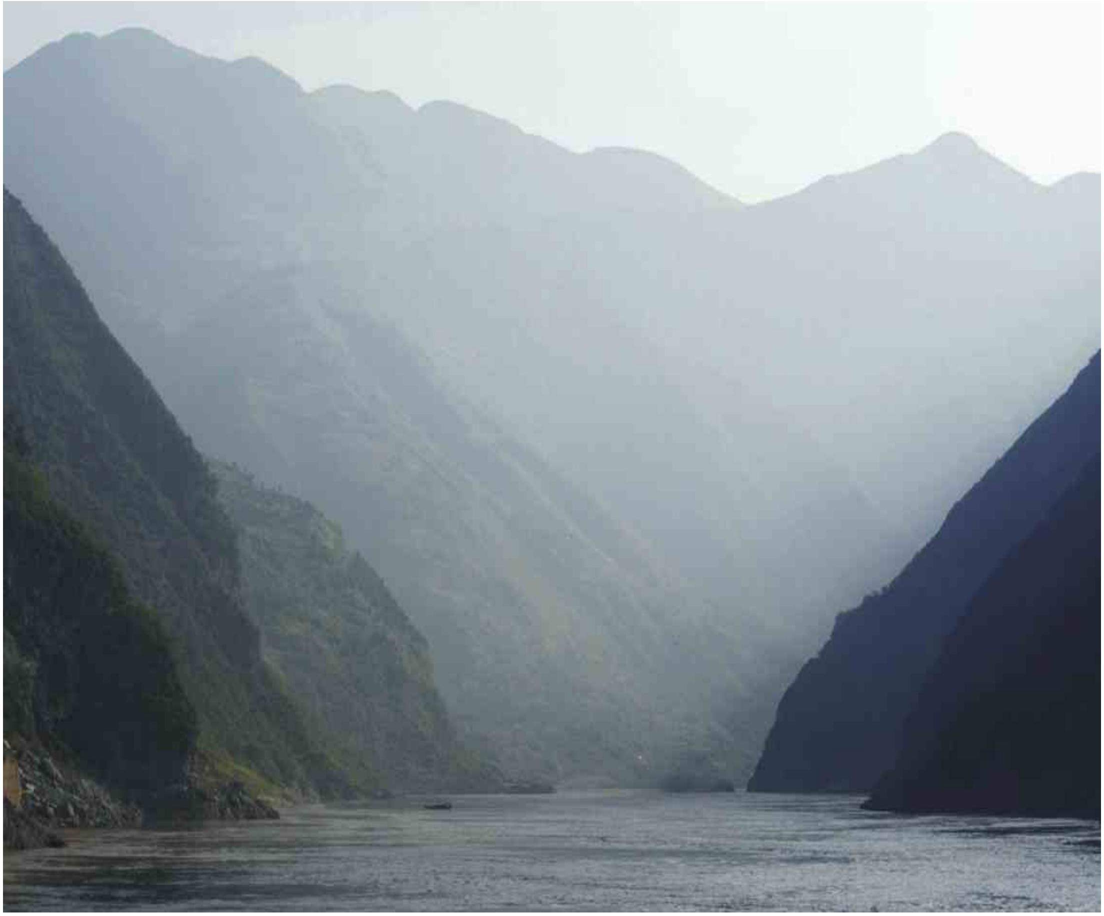
Services	Comments and Examples	Permanent and Temporary Rivers and Streams	Permanent Lakes, Reservoirs	Seasonal Lakes, Marshes, and Swamps, Including Floodplains	Forested Wetlands, Marshes, and Swamps, Including Floodplains	Alpine and Tundra Wetlands	Springs and Oases	Geothermal Wetlands	Underground Wetlands, Including Caves and Groundwater Systems
Cultural (continued)									
Educational	opportunities for formal and informal education and training	⬤	⬤	●	●	•	•	•	•
Supporting									
Biodiversity	habitats for resident or transient species	⬤	⬤	●	●	•	•	•	•
Soil formation	sediment retention and accumulation of organic matter	⬤	•	●	⬤	•	?	?	
Nutrient cycling	storage, recycling, processing, and acquisition of nutrients	⬤	⬤	⬤	⬤	•	•	?	•
Pollination	support for pollinators	•	•	•	●	•	•		

Services	Comments and Examples	Estuaries and Marshes	Mangroves	Lagoons, Including Salt Ponds	Intertidal Flats, Beaches, and Dunes	Kelp	Rock and Shell Reefs	Seagrass Beds	Coral Reefs
Coastal Wetlands									
Provisioning									
Food	production of fish, algae, and invertebrates	⬤	⬤	•	●	•	●	•	●
Fresh water	storage and retention of water; provision of water for irrigation and for drinking	•		•					
Fiber, timber, fuel	production of timber, fuelwood, peat, fodder, aggregates	⬤	⬤	●					
Biochemical products	extraction of materials from biota	•	•			•			•
Genetic materials	medicine; genes for resistance to plant pathogens, ornamental species, and so on	•	•	•		⬤			•

Scale is low•, medium ●, to high: ⬤ ; not known = **?**; blank cells indicate that the service is not considered applicable to the wetland type. The information in the table represents expert opinion for a global average pattern for wetlands; there will be local and regional differences in relative magnitudes.

Services	Comments and Examples	Estuaries and Marshes	Mangroves	Lagoons, Including Salt Ponds	Intertidal Flats, Beaches, and Dunes	Kelp	Rock and Shell Reefs	Seagrass Beds	Coral Reefs
Regulating									
Climate regulation	regulation of greenhouse gases, temperature, precipitation, and other climatic processes; chemical composition of the atmosphere	●	●	●	•		•	•	●
Biological regulation (C11.3)	resistance of species invasions; regulating interactions between different trophic levels; preserving functional diversity and interactions	●	⬤	●	•		•		•
Hydrological regimes	groundwater recharge/discharge; storage of water for agriculture or industry	•		•					
Pollution control and detoxification	retention, recovery, and removal of excess nutrients and pollutants	⬤	⬤	●		?	•	•	•
Erosion protection	retention of soils	●	⬤	•				•	•
Natural hazards	flood control; storm protection	⬤	⬤	•	•	•	●	●	⬤
Cultural									
Spiritual and inspirational	personal feelings and well-being	⬤	•	●	⬤	•	•	•	⬤
Recreational	opportunities for tourism and recreational activities	⬤	•	•	⬤	•			⬤
Aesthetic	appreciation of natural features	●	•	●	●				⬤
Supporting									
Biodiversity	habitats for resident or transient species	●	●	•	⬤	•	⬤	•	⬤
Soil formation	sediment retention and accumulation of organic matter	●	●	•	•				
Nutrient cycling	storage, recycling, processing, and acquisition of nutrients	●	●	●	•	•	•		●

Source: Finlayson, C.M., D'Cruz, R. & Davidson, N.C. 2005. Ecosystems and Human well-being: wetlands and water. Synthesis. Millennium Ecosystem Assessment. World Resources Institute, Washington D.C.



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Three Gorges Dam (Sanxia) on the Yangtze River, Hubei Province, China.

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