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).

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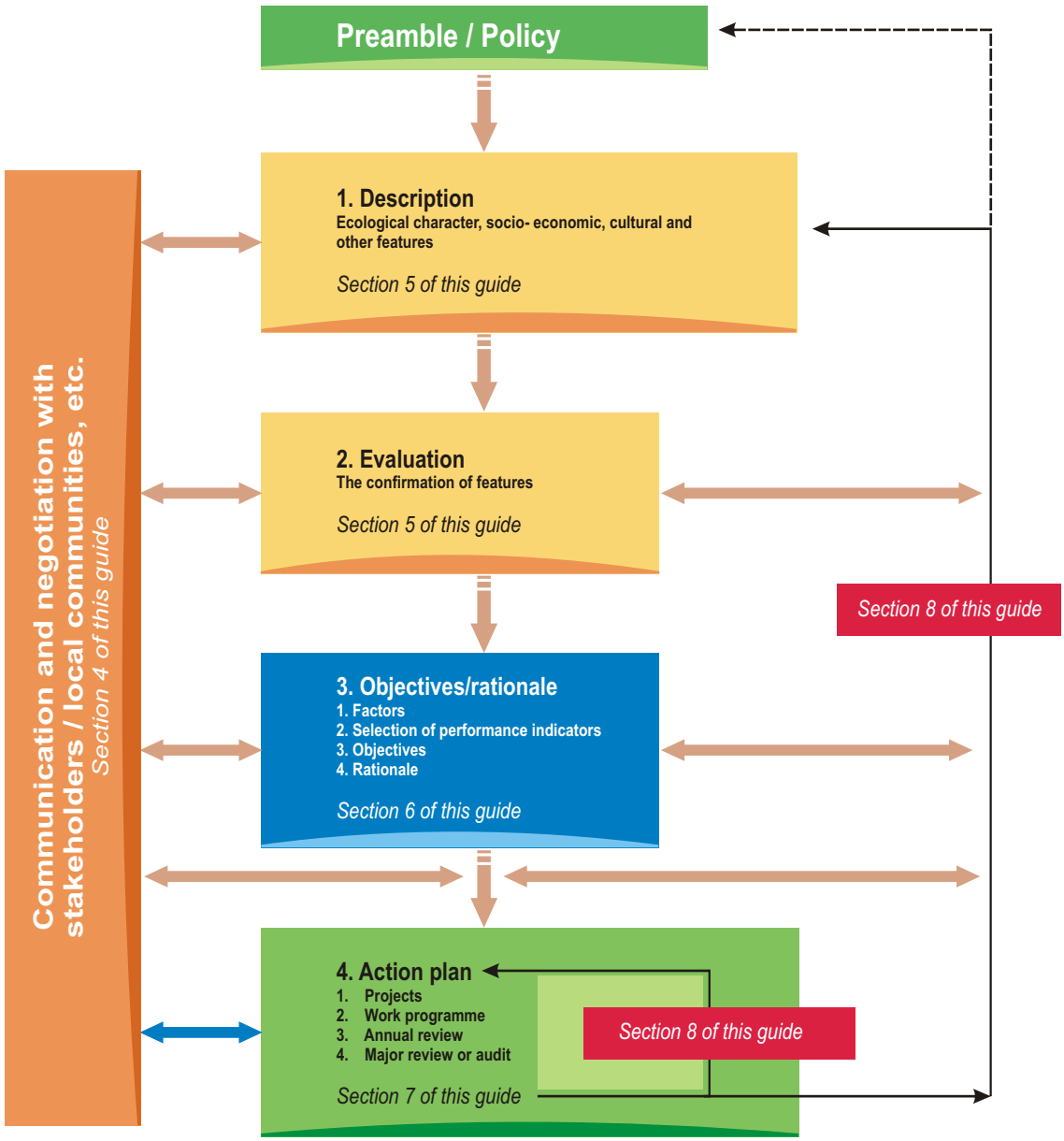
WWF - India / Pankaj Chandan

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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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.

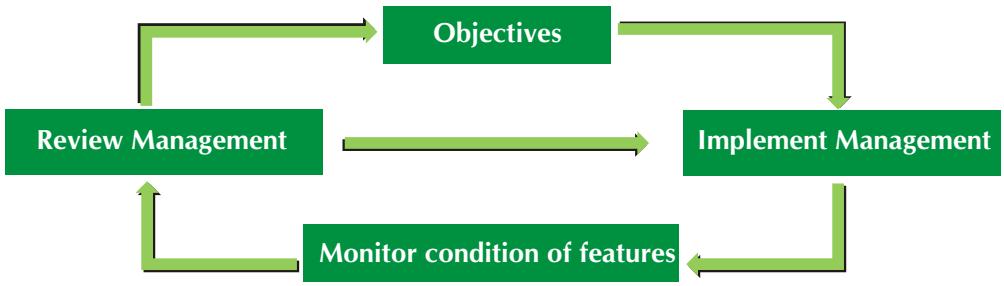


Fig. 1. The adaptive management cycle.

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.

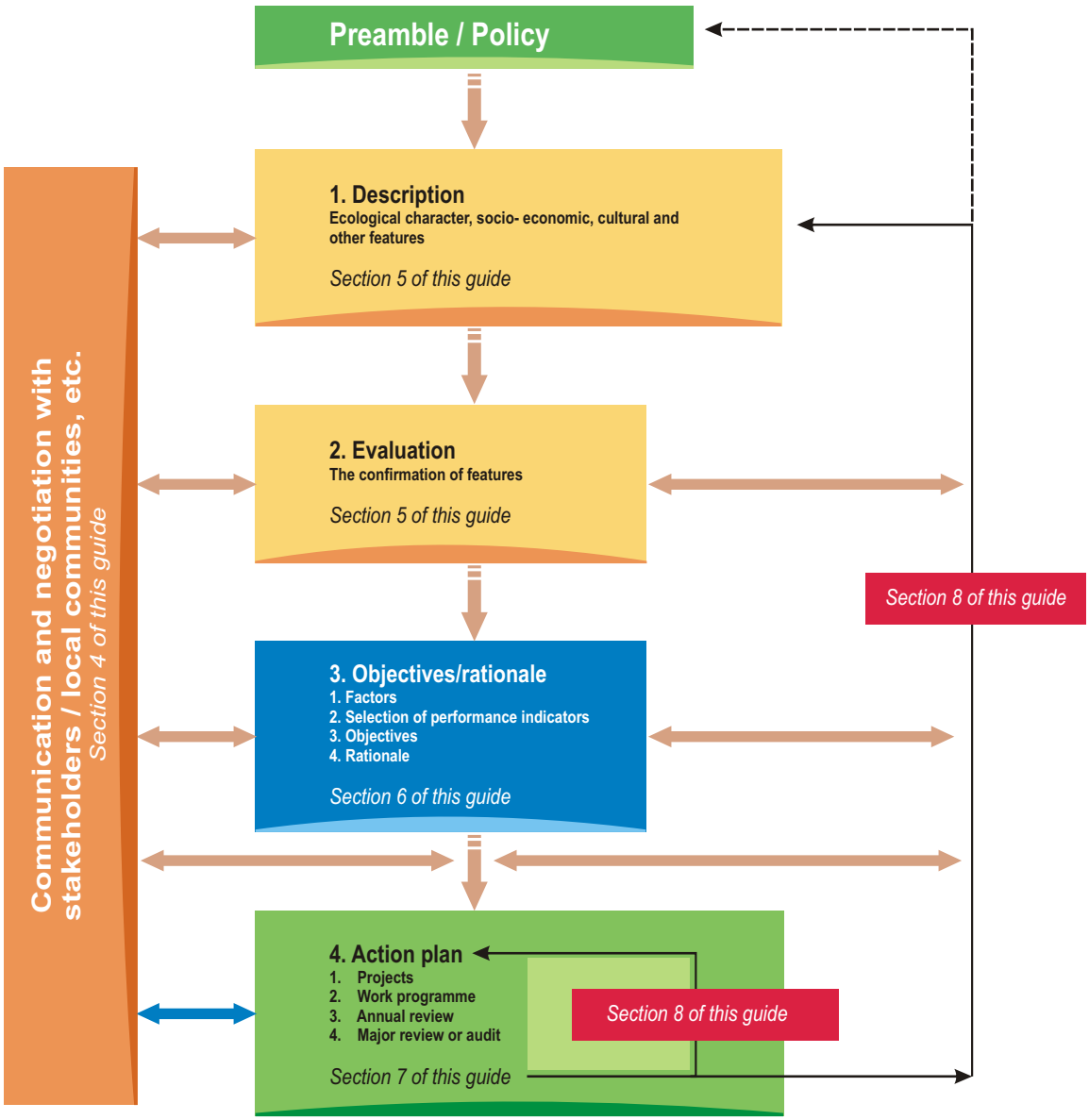


Fig. 2. Overview of steps in management planning.

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.

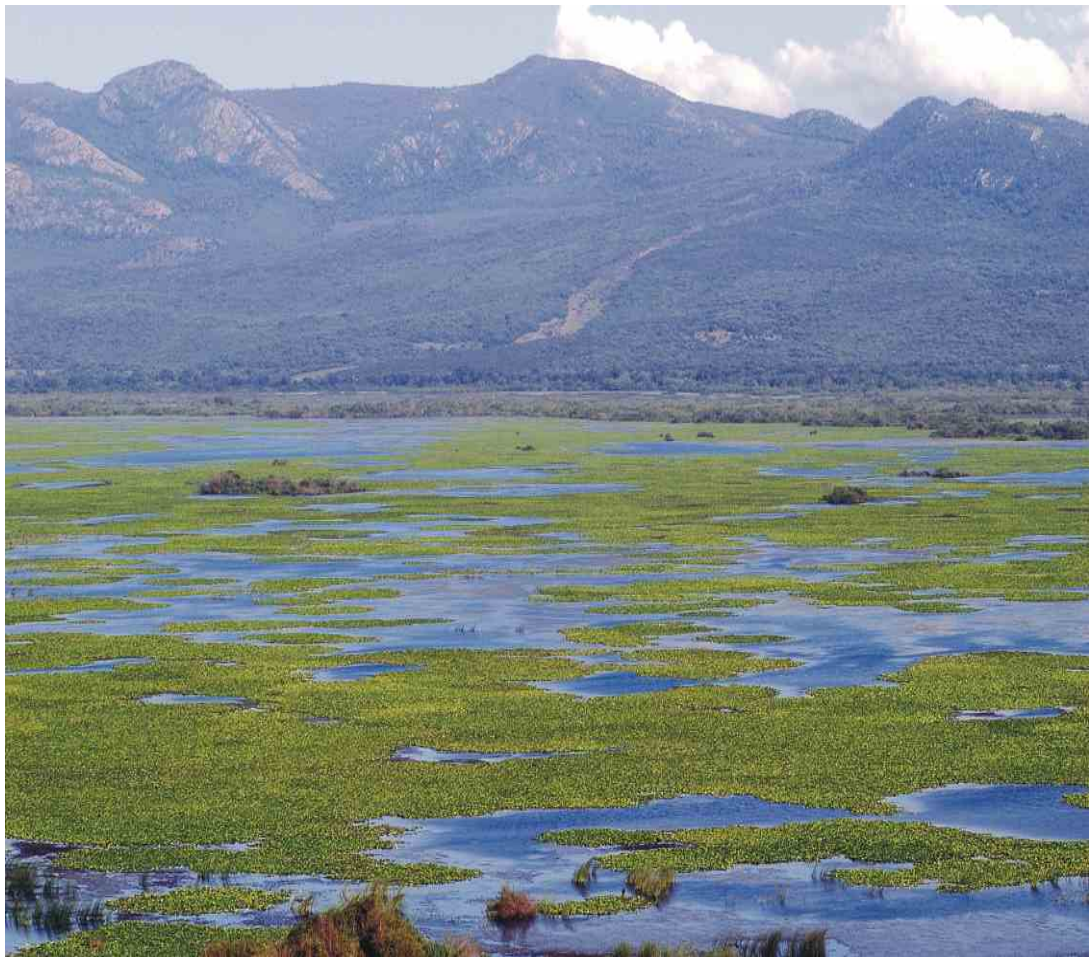
See the *Case Study 3* for further information.

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).