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**Restoration as an element of national planning for wetland
conservation and wise use¹**

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The objectives of the paper are (i) to outline why wetland restoration is needed and (ii) to present suggestions and guidance on how restoration and rehabilitation can be promoted on a national scale, e.g. be factored into planning, policy and administration of governments at all levels.

Introduction

1. Restoration of former or degraded wetlands has in recent years gained momentum over most of the globe. Examples range from the mighty Logone Floodplain in Cameroon to the tiny Hestur Mire in Iceland, from the Azraq Oasis in Jordan and Hula Lake in Israel to Lake Karla in Greece, the Babina and Cernovca Polders in the Danube Delta of Romania, the River Skjern Delta in Denmark, the shoreline marsh restoration areas in California and the Everglades Swamps in Florida, as well as the mangrove restoration in Thailand, the Philippines and Indonesia, the Mary River wetlands in Australia and the Upper Waitaki River system in New Zealand. These are all some of the visible evidence of people's wish to restore wet ecosystems which have lost their functions and values due to former reclamation.
2. Wetlands have for a long time, and in many cultures, been considered as wastelands. The increasing efforts being made to restore or rehabilitate them shows that this attitude is changing. This is also reflected in the National Reports submitted by the Contracting Parties for COP7 where, as of 10 March 1999, 75 out of 107 Reports indicated that wetland restoration or rehabilitation is taking place in the country.

¹ See also the associated draft resolution Ramsar COP7 DOC. 15.17.

3. This paper will give an overview of why restoration of wetlands is needed and how it can be promoted and introduced as an element of national or sub-national planning for wetland conservation and wise use.

Wetland restoration and the Ramsar Convention

4. When the Ramsar Convention was developed and signed by the first member countries in 1971, very few wetland restoration activities had taken place. On the contrary, as destruction of wetlands at that time was going on at an accelerating rate, all efforts were devoted to the conservation of still-existing wetlands and to the introduction of the concept of wise use. Thus it is perhaps not surprising that the 28-year-old Convention does not provide significant guidance or obligations for the Contracting Parties in the area of restoration or rehabilitation.
5. Subsequently, restoration of wetlands became a theme at the 4th (1990) and 6th (1996) Conferences of the Contracting Parties, where recommendations 4.1 (Montreux) and 6.15 (Brisbane) urged the member states to consider and promote wetland restoration.
6. Restoration of degraded natural habitats (including wetlands) has been integrated in other and more recent international and regional conventions, treaties and directives -- for example, the Convention on Biological Diversity (Rio, 1992; Article 8f) and the European Communities Directives on Protection of Wild Birds (1979) and Natural Habitats (1992), the Trilateral Joint Declaration on the Conservation of the Wadden Sea (The Netherlands / Germany / Denmark) and the Black Sea Action Plan.

Wetland restoration and rehabilitation - can the losses of wetland functions and values be reversed?

7. The losses of functions and values of natural wetlands resulting from human impacts are in geological terms a recent phenomenon. But human-induced changes of wetlands, whether there were to riverine, standing waters or coastal ecosystems, have taken place in parts of the world during the last four millennia (Mesopotamia, Egypt, China, Siam, the Inca Kingdom, etc.), where watering has taken place and provided for the blooming of the cultures. For other major regions such as the temperate, subtropical and tropical parts of North America, Asia, Europe, and parts of Africa, impacts became visible during the last centuries and accelerated in this century as power and the tools needed for the modifications of waterlogged ecosystems became much more efficient and globally available.
8. So far, the experiences from many restoration and rehabilitation projects and programmes shows that it is virtually impossible to restore wet ecosystems exactly as they were in terms of physical appearance, species composition and ecological processes. This can never be done 100 %, partly because wetlands are dynamic ecosystems, partly because some the specific attributes of the former wetlands are subject to irreversible losses when the reclamation has taken place, and partly due to lack of descriptions and baseline information on the situation before the impact occurred. In addition, for economic and political and/or practical reasons, in many cases compromises in the design of a restoration project have to be made.

9. Nevertheless, many examples from projects and programmes implemented in the most recent years prove that it is possible to restore a number of the functions and values formerly provided by wetlands, and in the light of the benefits which are provided by them, there are several good reasons to do this. Not the least of these is that many of these functions are now known to be very beneficial to man.

Why is restoration needed? Some good reasons!

10. There are a number of good reasons for taking up restoration and rehabilitation activities in degraded wetlands. These are essentially the same as the reasons for conserving natural wetlands - the valuable functions and services they provide. Despite the fact that it is nearly always very difficult, or may be impossible, to restore wetlands exactly as they were before they were converted, there are now many examples of restoration projects in which at least some of these functions and values have been re-established.
11. The most important wetland functions are (IUCN 1990, modified):
 - i. Groundwater recharge
 - ii. Groundwater discharge
 - iii. Flood control
 - iv. Shoreline stabilisation/erosion control
 - v. Sediment/toxicant retention
 - vi. Nutrient retention
 - vii. Biomass export
 - viii. Storm protection/windbreak
 - ix. Micro-climate stabilisation
 - x. Water Transport
 - xi. Recreation/Tourism
 - xii. Protection of fresh water resources against salinization
12. In addition, wetlands provides various important products and benefits such as:
 - i. Forest resources
 - ii. Wildlife resources
 - iii. Fisheries
 - iv. Forage resources
 - v. Agricultural resources
 - vi. Water supply
13. Finally, they hold attributes essential for the conservation of biological diversity, and many possess unique cultural heritage.
14. There are many major restoration projects which are now under way in order to return these functions and benefits, as follows:
 - i. Restoration of fisheries and pastoral areas: The Waza Logone Floodplain, Cameroon .

- ii. Restoration for flood control: Lower reaches of the Rhine in The Netherlands and Germany and Lake Fetzaraoire in Algeria.
- iii. Water storage: Azraq Oasis, Jordan.
- vi. Shoreline stabilisation, storm protection and fisheries: mangrove restoration in Malaysia, Thailand, Bangladesh, Australia, the Philippines, Indonesia, India, Vietnam and China.
- v. Nutrient retention and removal: comprehensive program for restoration of wetlands in Denmark to remove nitrates to reduce eutrophication of marine areas, Etang de l'Or coastal lagoon, France, Lake Hula, Israel.
- vi. Protection of freshwater, groundwater and soil resources against salinization: restoration of Katarapko Lagoon and other wetlands in Australia and coastal wetlands in Denmark in order to prevent intrusion of salt water, Lake Karla, Greece.
- vii. Restoration or rehabilitation of wetlands to enhance conservation of biodiversity and/or promotion of recreation/tourism: Lake Hornborga and Lake Draven, Sweden, floodplain restoration in Austria, the Everglades Swamps, Florida, USA, Molentargius wetland complex, Italy and many others.
- ix. Restoration of major, now dwindling, river deltas: Louisiana River Delta, USA.

Where is restoration needed? The global and ecosystem perspectives

- 15. The latter half of this century in particular has witnessed the most widespread destruction and modification ever seen of wet ecosystems: rivers and streams were and are channelled or dammed; shallow lakes, marshes, bogs and mires drained and cultivated; and coastal ecosystems were, and are, embanked and reclaimed or destroyed through mangrove-felling, exploitation of coral reefs, etc. In addition to the physical changes and destruction of many wet ecosystems, eutrophication, acidification, chemical pollution or the occurrence of invasive species has, during the last decades, contributed to the deterioration of many wet ecosystems.
- 16. Only a few major wet ecosystems in the Arctic and Antarctic regions, the vast peat-mires of the sub-arctic regions, the riverine systems in Siberia, Canada, the Amazonas, the Panatal and parts of central Africa are still in a relative pristine state. In these places the discussion of restoration and rehabilitation in 1999 is still largely irrelevant (compared to the needs for conservation and sustainable use of the wetlands).

Inventories of former or degraded wetlands are needed

- 17. Only a few countries have so far prepared inventories of their former wetlands and/or assessed the needs for restoration or rehabilitation of their degraded sites. Exceptions are Australia, Denmark, Sweden, New Zealand, the Netherlands and (certain states in) the USA. On regional or local scales more examples can be found, but in order to be able to prioritise restoration activities such inventories and overviews should be carried out to provide optimal background for more systematic efforts.
- 18. With the perspective of ecosystem enhancement, restoration is obvious for many habitats, but comprehensive analysis of the benefits provided and the efforts needed (including socio-economic aspects and gender considerations) are widely lacking on both national and regional scales.

Shallow fresh and coastal temperate-tropical wetlands have disappeared or lost vital functions

19. Immediately, it seems that fresh, shallow, open water (< 1 metre depth) and marsh-ecosystems (mires, fens, salt-marshes, reed-swamps and mangroves, etc.) are those which are under most pressure and where restoration or rehabilitation can be beneficial to the habitats and human communities. The reason for the major losses of wetland functions is mainly that these wetlands, from a technical point of view, have always been easier to reclaim than deeper or more remote wet ecosystems. This is also extremely pronounced for coastal ecosystems in tropical, subtropical and temperate latitudes.

River rehabilitation needed - whole catchment approach recommended

20. Riverine ecosystems are normally integrated with adjacent standing water ecosystems, but they are subject to various impacts changing and reducing their natural functions as well. Examples include damming and channelization, which cause serious losses of nursery grounds for fish, nutrient retention and siltation. It should also be stressed that restoration of wetlands as parts of the river ecosystem - especially if approaches or strategies can be used covering whole catchment areas - is a vital and necessary tool to bring back lost functions and benefits, reduce the risks of downstream flooding, improve water-quality and re-establish plant communities and stocks of fish and other wildlife.
21. Again, there are an increasing number of practical examples of restoration of watercourses, but few comprehensive strategies adopted at national and regional or whole catchment levels. New regional examples of restoration and rehabilitation for whole riverine ecosystems (including, in principle, the catchment area) are provided through the Danube River Convention, to be adopted by the 12 European countries in the Danube catchment area, and the Strategic Action Plan for the Rehabilitation and Protection of the Black Sea (1996) which also stresses the need for restoration of adjoining wetlands.
22. It is recommended to intensify the efforts to elaborate river basin management plans, where the needs for restoration and rehabilitation also are duly considered and take into consideration former or degraded wetlands as integrated elements of the whole catchment areas. The Florida Everglades (46,000 km²) in USA and the Logone Floodplain (8,000 km²) in Cameroun are good examples of major restoration projects in which the whole or major parts of large watersheds are included. Kenya is another example, in which a whole catchment approach is now being used which includes erosion control through afforestation.

How can restoration and rehabilitation be promoted on national and regional scales?

23. The National Reports for the period 1996-98 prepared for the 7th meeting of the Conference of the Contracting Parties to the Convention of Wetlands show that restoration and rehabilitation of wetlands are now considered as a priority in a majority of the Contracting Parties. In most countries the level of activity is rather low or in an initial phase, where few and sporadic pilot-projects are planned or implemented. Only a handful of member states

have developed strategies or action plans for promoting restoration and rehabilitation on a national² or regional scale. Some cases provide experiences which can help stimulate these development in other countries.

How to start or advance the process: pilot projects, inventories, public involved

24. In the early phases, pilot restoration projects, which may often be initiated by NGOs and/or local people, can provide - especially if they are successfully implemented! - important stimuli for a process whereby policy decision-makers and public opinion support the development of further restoration strategies.
25. In order to ensure that the pilot projects (and those coming up later!) are successful, a number of criteria should be observed. These include careful consideration of both environmental aspects, consequences and interests of all stakeholders and economic and other aspects as well (see Box 1).
26. An important tool for selecting sites for restoration or rehabilitation is comprehensive national or regional inventories of former reclaimed and degraded wetlands, including a judgement of the possibilities and purposes of restoration and rehabilitation. Such inventories may be carried out by research institutions, universities and similar institutions, if possible in cooperation with and support from national and regional nature management authorities. Only a few countries (e.g., Australia, Denmark, Sweden, New Zealand, the Netherlands) have so far made such inventories. In developing countries, such inventories may be subjects for assistance provided by bilateral or multilateral partners as part of environmental assistance programmes.
27. In all cases it is important to involve local people and stakeholders in an early phase of the process and to give high priority to project ideas and proposals stemming from these local people. National interests and policies may, however, in some cases be incompatible with local ideas and opinions.

Develop strategies and action plans - important preconditions

28. More comprehensive strategies and action plans for wetland restoration covering a whole country, state or region are useful tools for having restoration and rehabilitation acknowledged, politically adopted and integrated into legislation and physical planning. Besides, it will very often be easier to obtain funding for implementing projects and programmes, if they are parts of such (adopted) plans and programmes.
29. Strategies and action plans may be developed by the National Wetland Committees (assisted by research institutes, governmental organisations and NGOs as well as secretariats with sufficient resources), but it is important that they are based on careful, multi-disciplinary

² Ramsar COP7 DOC. 17.3, Laws and Institutions, page 10.

studies and analyses which reveal the consequences, advantages and disadvantages of the strategies and plans.

Box 1. Criteria for selection of sites for restoration

A. Is the project worthwhile?

- i. Are there environmental benefits related to restoration and rehabilitation, e.g. improved water supplies and water quality (reduced eutrophication, preservation of freshwater resources, biodiversity conservation, improved management of “wet resources”, flood control?)
- ii. The economic aspects of the project - relatively low expenses, e.g. low costs for technical works and compensation to land-users and owners - should be a priority. Cost-effectiveness aspects are important.
- iii. What options, advantages or disadvantages will the restored area provide for local people and for the region? These may range from health conditions and essential food and water resources to increased possibilities for recreation and ecotourism.
- iv. Are there improved scenic values? Options for educational purposes (wetland ecology, sustainable resource management)
- v. Are there aspects relating to cultural history, i.e. conservation of antiquities?
- vi. Can the project contribute to fulfilling international obligations relating to conservation and sustainable use of wetlands?

B. Is the project possible?

- i. The ecological aspects of the project. Present status of the area and expected development of the future habitats with respect to plant and animal communities/species, water quality, hydrology and geomorphology.
- ii. The status of the area in terms of present land-use. The situation will differ widely between developing countries, countries in transition, and developed countries and with respect to the objectives of restoration and rehabilitation, but marginal lands yielding few benefits in the present situation may be a target.
- iii. Is there a positive regional and local interest in realisation of the project? Are all stakeholders identified? Are the socio-economic consequences known and considered?
- iv. Is the project possible from a technical point of view, e.g., will it need restoration machinery and methods which are not available?

30. Thus, it is important to cover not only biological and hydrological aspects, but economic, socio-economic and cultural history aspects as well. As a consequence, it will very often be useful from an early stage to have broadly composed steering or advisory committees attached to the working phase with representatives from governmental and regional authorities, the scientific community, landowners and -users organizations, the private sector, NGOs (“green” and others), etc.
31. In a number of cases strategies and action plans may not cover a whole region or country in a broad sense, but may have a thematic approach to restoration and rehabilitation and develop strategies and action plans for only a single or few functions and values, e.g., flood control, reduction of pollution or conservation of biodiversity.
32. Examples of where nationwide action plans or initiatives for restoration and rehabilitation are developed include the Netherlands, France, Denmark, New Zealand, the USA (e.g., through the Clean Water Action Plan) and several other countries. In some countries, action plans are implemented for specific habitats, e.g., in Canada for excavated peat mires, and in Sweden acidified lakes and watercourses receive lime to neutralise the water and maintain fish and other populations.

To integrate strategies and action plans into national and regional policies: physical planning, legislation and funding

33. So far only a few countries (e.g. Denmark, the Netherlands) have integrated strategies and action plans for wetland restoration into their national and regional physical planning. Integration into national and regional policies can be promoted through the dissemination of information on wetland values in general, and specifically related to the major and more visible restoration and rehabilitation projects which are implemented. Thus, the dissemination of information should be an integrated activity during the whole phase of implementation and cover the project cycle from planning and preparation, involvement of local stakeholders, the practical realisation of construction works, opening ceremonies attended by high-level personalities, and the results of subsequent monitoring programs.
34. Integration of restoration and rehabilitation into physical planning and legislation can be promoted also through site visits of decision-makers and exchange of information by study visits to restored wetlands abroad and/or to those countries which have launched the theme into their national planning and legislation. The National Wetland Committees, or similar advisory organizations, with representatives from different core ministries may have particular qualifications for promoting the process and taking action. National strategies based on institutionally adopted guidelines defining the areas of former or degraded wetlands to be restored within a specified period can promote concrete action plans.
35. The vast majority of countries have today only “defensive” legislation protecting existing wetlands and Ramsar sites. A few countries have changed their legislation and prioritised nature restoration, e.g., upgraded it to be a part of the objective clause of nature protection legislation (e.g., Denmark) or integrated restoration into action plans for the water sector (e.g., USA). This again assists in making funds available for further activities.

36. It should be noted that many countries will be able to initiate restoration activities (pilot projects) even though these may be only a pilot phase. Successfully implemented restoration projects may often stimulate an increased public interest in wetlands and act synergetically with conservation activities.
37. Funds for restoration and rehabilitation can be raised through sources based on public taxes, specific fees from certain groups that have special interest in the subject, such as hunters, anglers and naturalists, the private sector and industries exploiting or dependent on wetlands. For developing countries, funding may also be available through bi- and multilateral assistance programs targeting both conservation and sustainable use of wetlands as well as the water sector in a broader sense. There is in this respect a need to review the possibilities for assistance for restoration and rehabilitation in the various international assistance programs, e.g., the GEF and the regional development banks funding.

Some guidelines for successful wetland restoration

38. In conclusion, a number of guidelines for successful wetland restoration and rehabilitation can be summarised. They are not suited to all circumstances and it should be stressed that restoration and rehabilitation activities very often are both expensive and cumbersome and hardly alternatives to the conservation of still intact or slightly modified natural wetlands. However, in many countries and regions there is a need to bring back the lost assets of the wet ecosystems.

Box 2: Guidelines for successful wetland restoration and rehabilitation

- i. National planning and legislation on protection and sustainable use of nature, environment and water management should be developed to include obligations or (at least) options for wetland restoration. This may also promote the allocation of funds for restoration purposes.
- ii. Multiple purposes such as conservation of biodiversity, provision of reliable food resources, fresh water supply, purification, flood control and recreation may often increase the sustainability and total benefits of a restoration project.
- iii. Identify all stakeholders in an early phase. The realisation of a project is dependent on the cooperation between landowners and/or land-users, the public authorities and politicians at different levels, technical and scientific consultants and non-governmental organizations.
- iv. Many projects need careful pre-investigations and environmental impact assessments before realisation.
- v. Successfully implemented pilot projects can provide much inspiration and stimuli for the development of forthcoming restoration projects and programs.
- vi. General and popular information about effects and consequences before, during and after the implementation of projects are important.

- vii. The investments and changes should in a longer term be sustainable, not only yielding temporarily results. Conservation and management plans for the restored areas should be adopted in an early phase.
- viii. Look for relatively low costs in the reconstruction phase.
- ix. Aim at low or nil running costs for future maintenance of the areas. In a number of cases it will also be possible to generate income/benefits from the areas.
- x. Monitoring of the effects and dissemination of information on the results is recommended.

Epilogue

- 39. Restoration and rehabilitation of wetlands have in the most recent years been more widespread and politically recognised activities in a number of countries. Some countries have even gone so far as to set targets for their restoration activities. Examples include the USA, which has set out to achieve a net gain of 40,000 ha of wetlands per year by 2005, and Denmark, which aims to achieve a net gain of 3,000 ha per year by 2003. Not surprisingly, the restoration and rehabilitation activities are now mostly developed in some of the countries which have lost, relatively speaking, more of their natural wetlands and which have the largest resources for taking up the activities and implementing expensive programmes.
- 40. The National Reports submitted by the Contracting Parties to COP7 reveal, however, that a majority of Ramsar member states now consider wetland restoration and rehabilitation to be a priority in their country. Many pilot activities have been established during the last few years and a number of countries, including many developing countries, intend to develop restoration and rehabilitation projects and programmes within the coming years. This underlines the need for additional resources to this field, including recommendations, guidelines and strategies under the umbrella of the Ramsar Convention.
- 41. In conclusion, wetlands may be the first major ecosystem which mankind, on a global scale, will try to restore and rehabilitate to compensate for the environmental destruction and mismanagement which have taken place in the past.