

"Wetlands: water, life, and culture"
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Principles and guidelines for wetland restoration

Adopted by Resolution VIII.16 (2002) of the Ramsar Convention

Introduction

1. The need to reverse wetland degradation, in addition to the recognition of benefits associated with wetland restoration, has led to initiation of numerous restoration projects globally. Although there is increasing interest in wetland restoration and opportunities are widespread, efforts to restore wetlands are still sporadic, and there is a lack of general planning at the national level. Individuals and organizations interested in restoration often work in isolation and without the benefit of experience gained on other projects.
2. Recognizing the importance of past experience in wetland restoration and the increasing interest in restoration among Contracting Parties, Recommendation 6.15 of the Ramsar Convention urged “the Scientific and Technical Review Panel [STRP], in collaboration with the Bureau and concerned Contracting Parties and partners, to define guidelines on principles for wetland restoration”. The STRP was tasked with further developing these tools and guidelines by Resolution VII.17 concerning *Restoration as an element of national planning for wetland conservation and wise use*.
3. Although Operational Objective 4 of the Strategic Plan 2003-2008 refers to both “restoration” and “rehabilitation”, the difference between these two terms is not clear. The Ramsar Convention has not attempted to provide precise definitions of these terms. While it might be said that “restoration” implies a return to pre-disturbance conditions and that “rehabilitation” implies an improvement of wetland functions without necessarily returning to pre-disturbance conditions, these words are often used interchangeably both within Ramsar documentation and within the conservation literature. These *Principles and guidelines for wetland restoration* use the term “restoration” in its broadest sense, which includes both projects that promote a return to original conditions and projects that improve wetland functions without necessarily promoting a return to pre-disturbance conditions.
4. Further guidance on tools and methods, including case studies, for wetland restoration, has been developed by the STRP and is available on the restoration pages of the Ramsar Web site at http://ramsar.org/strp_rest_index.htm.
5. General principles and guidelines based upon experience with many projects in many settings can offer a useful starting point for restoration projects. The principles presented here provide the underlying ideas that form the foundation of a successful restoration project, and as such they should be integrated into national wetland policy (see also Ramsar’s *Guidelines for developing and implementing National Wetland Policies* (Resolution VII.6)).

6. The guidelines presented here provide a step-by-step process guiding the identification, development and implementation of a restoration project, and as such they can be integrated into administrative guidelines.
7. However, every restoration project is unique, and whilst these principles and guidelines are designed to be useful in many situations, they are neither universally applicable nor definitive.

Principles

8. A national programme and priorities for wetland restoration should be established, based on a national inventory of wetlands with potential for restoration, as a component of the national wetland policy, plan or strategy, so as to maximise the benefit to the overall conservation status and wise use of wetlands of the efforts and resources applied to wetland restoration.
9. A clear understanding and statement of goals, objectives, and performance standards for wetland restoration projects is a critical part of restoration success (see the text box and Guidelines, below). In keeping with the Annex to Ramsar Resolution VII.17 on restoration as an element of national planning for wetland conservation and wise use, goals and objectives should recognize that wetlands perform multiple functions: “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.” If a project hopes to promote a return to pre-disturbance conditions, this should be stated as part of the project goals, with more detailed information on exactly what this means incorporated into project objectives. However, it should be noted that not all restoration projects will hope to promote a return to pre-disturbance conditions and that a return to pre-disturbance conditions is not implied by the word “restoration” as used in these *Principles and guidelines for wetland restoration*.
10. Careful planning will limit the possibility of undesirable side effects. For example, careful planning can allow restoration projects to avoid problems such as increased numbers of mosquitoes, unwanted flooding, or saltwater intrusion into sources of drinking water. To assist in planning, an assessment should be made of the features of the site under consideration, and the factors that may affect its feasibility and success (see Box 2 for issues to consider).
11. Natural processes and existing conditions should be considered during project selection, design, and development. To the extent that is possible, ecological engineering principles should be applied in preference to methods requiring hard structures or extensive excavation.
12. Recommendation 4.1 of the Ramsar Convention rightly notes that “the maintenance and conservation of existing wetlands is always preferable and more economical than their subsequent restoration” and “restoration schemes must not weaken efforts to conserve existing natural systems”. Both quantitative data and subjective assessments clearly show that currently available restoration techniques almost never lead to conditions that match those of pristine natural ecosystems. As a corollary to this, trading high-quality habitat or ecosystems for promises of restoration should be avoided except in the case of overriding

national interests. However, restoration of individual sites can contribute to ongoing management of existing high quality wetlands by, for example, improving overall catchment condition and contributing to improved water allocation management.

13. Whenever possible, the minimum acceptable scale for wetland restoration planning should be at the catchment level. Individual, relatively small restoration projects targeting a single wetland can be valuable provided that they are planned within the context of the catchment. Wetland restoration planning should not ignore the value of upland habitats and linkages between upland and wetland habitats.
14. Wetland restoration planning should consider water allocation principles and the role that restoration can play in maintaining ecological functions of wetlands - see Ramsar *Guidelines for the allocation and management of water for maintaining the ecological functions of wetlands*, as adopted by Resolution VIII.1.
15. Wetland restoration should be an open process that involves local community stakeholders as well as stakeholders who will be affected by a project even though they may be geographically distant from the project, for example, stakeholders living well downstream. All stakeholders, including local communities and indigenous people and sectoral interests both *in situ* and *ex situ*, should be fully involved in a wetland restoration project from its earliest stage of consideration through its implementation to its long-term stewardship.
16. Restoration requires long-term stewardship, including ongoing management and monitoring (see *A framework for designing an effective wetland monitoring programme*, annex to Resolution VI.1). Successful restoration should be designed, as far as possible, for self-maintenance, but it also generally requires a constituency that understands the need for long-term stewardship, the resources required to support this stewardship, and a commitment to delivering this stewardship. Development of incentive measures can make a valuable contribution to the long-term success of a restoration project (see Resolution VII.15, *Incentive measures to encourage the application of the wise use principle*).
17. Wetland restoration planning should incorporate, where practicable, knowledge of the traditional resource management that contributed to shaping the landscape. Incorporation of traditional environmental knowledge, management, and sustainable harvesting practices by local people should be an integral component of restoration.
18. The principles of adaptable management (see the *New Guidelines for management planning for Ramsar sites and other wetlands*, adopted by Resolution VIII.14) should be applied to restoration projects. As a project develops, modifications may be necessary to accommodate unforeseen developments and take advantage of newly acquired knowledge or resources. Any modifications should be designed in the light of evaluation of the project against its established goals, objectives, and performance standards.
19. Successful restoration projects can provide inspiration and stimulus for continuing stakeholder involvement and for the development of further projects and programmes. Information on proposals for, and the results and successes of, a restoration project should be widely disseminated both in scientific and technical fora and as popular information accessible to stakeholders.

20. Restoration interventions should be coupled with measures to raise awareness and influence the behaviours and practices that led to the degradation of the ecosystem, in order to ensure that the causes, as well as the effects, of degradation are addressed. These actions provide a further mechanism for landowners, resource users and surrounding communities to be drawn into restoration projects, and for applying the *Guidelines for establishing and strengthening local communities' and indigenous people's participation in the management of wetlands* (Resolution VII.8).

Guidelines

21. The flowcharts accompanying this text lay out guidelines for wetland restoration projects. The following points explain the flowcharts.
22. The boxes below represent steps that can occur concurrently or iteratively. For example, in some cases stakeholders cannot be completely identified until after a site has been selected, and changes in stakeholders concerned may lead to changes in goals, objectives, and performance standards.
23. Identify stakeholders and involve stakeholders with all aspects of work (Box 1 in Flowchart 1): Stakeholders should be involved with all key planning decisions throughout the restoration process.
24. Project goals, objectives, and performance standards (Box 2 in Flowchart 1): Many wetland restoration projects suffer from poorly stated (or unstated) goals and objectives. Without clearly stated goals and objectives, projects lack direction. By attaching performance standards to each project objective, stakeholders are forced to consider closely their goals and objectives, and often the development of performance standards leads to revision of goals and objectives. An example of a goal for a project might be to increase the quality of wildlife habitat. An associated objective might be to improve habitat value for certain species, such as migratory waterfowl. Performance standards associated with this objective could specify the number of breeding pairs of several key species that are expected to use the site after restoration has been completed.
25. As a rule, a monitoring method that can be used to assess performance standards should be identified as part of the planning process, recognizing that different monitoring methods may not result in consistent measures. For example, a performance standard might require maintenance of 70% cover by a particular plant species, but different methods of estimating percentage of cover will yield different values for the same site. Project goals, objectives, performance standards, and monitoring methods should be written down, widely distributed, and frequently revisited to keep projects on track.

Box 1 - Goals, Objectives, and Performance Standards

Goals are general statements about desired project outcomes – stating goals allows all stakeholders to understand, in general terms, the desired direction of a project. Projects may have more than one goal, reflecting the multiple functions that individual wetlands perform.

Objectives are specific statements about desired project outcomes – projects typically have more than one objective, reflecting the multiple functions that individual wetlands perform.

Performance standards (sometimes called success criteria) are observable or measurable attributes that can be used to determine if a project meets its intended multiple objectives – each objective will have one or more associated performance standards.

26. Site selection (Box 3 in Flowchart 1): In many cases, restoration projects begin in response to conditions on a particular site, and thus the site is specified at the project's outset. However, some projects begin without a site. In these cases, several sites might be assessed before a final project site is identified. A proposed procedure for identification of potential restoration projects can be divided into three phases:
- i) Phase 1 aims to identify the spatial need for restoration of wetland functions and to set environmental constraints for restoration in each case.
 - ii) Phase 2 is more site specific, and evaluates the sustainability of the potential restoration projects through a synthesis of the environmental constraints derived from phase 1 and the socio-economic characteristics and other particularities of the catchment.
 - iii) Phase 3 is the final outcome, whereby the evaluation of the previous two phases permits identification and prioritization of potentially sustainable restoration projects. This final phase stems from the need to make sound decisions on wetland resource management and leads to successful, cost-effective projects with broad public acceptance.
27. Flowchart 2 and the following paragraphs elaborate on the process of site selection:
- i) Spatial analysis of catchments should help both to identify areas where there is a need for restoration of wetland functions and to rank the relative need for restoration in different catchments (Box {a} in Flowchart 2). For example, establishment of a wetland for the purpose of water quality improvement in a catchment with intense agricultural development would be far more critical than would be the case in a neighboring catchment with no apparent nutrient runoff problems.
 - ii) To contribute to spatial analysis of catchments, it is necessary to locate target areas for restoration through an inventory of lost and degraded wetlands and evaluation of functions (Box {b} in Flowchart 2).
 - iii) Spatial analysis of catchments requires assessment of wetland functions at the catchment level (Box {c} of Flowchart 2). This defines the status of wetland functions and sets priorities for actions required to sustain both existing ecosystems and uses. The functional evaluation should locate wetlands with the most severe degradation problems, identify those functions that should be restored at the catchment level, and set the general provisions for restoration.

- iv) After locating wetlands where restoration projects should be implemented, site-specific constraints should be recorded and evaluated in order to identify potential wetland restoration projects and set priorities for restoration (Box {d} of Flowchart 2). These should be identified at the catchment level and include ecological, scientific, technical, social, and economic parameters.
- v) Site-specific constraints include the availability of natural resources, such as availability of water, landscape morphology, substrate characteristics, and presence of flora and fauna (Box {e} of Flowchart 2). For restoration of a wetland, there are several ecological constraints derived from climate, geomorphology, and various other characteristics of the catchment.
- vi) In terms of socioeconomic factors, higher priority should be given to implementation of restoration projects that have public acceptance and active stakeholder involvement, that contribute to sustainable development, and that have some assurance of availability of the resources needed for realization (Box {f} of Flowchart 2).
- vii) A final decision (Box {g} of Flowchart 2) should be based on assessment of issues listed in Box 2 and which include consideration of:
 - a) spatial needs for the establishment of specific wetland functions;
 - b) the impacts of local decisions within a regional context;
 - c) the preservation, or rehabilitation if needed, of the soil and water resources of the catchment;
 - d) a plan for long-term change and unexpected events;
 - e) preservation of rare landscape elements, habitats, and associated species;
 - f) avoidance of or compensation for the effects of development on wetland functions; and
 - g) the presence of land-use and management practices compatible with the natural potential of the wetland.

Box 2. Issues to address in the assessment of the usefulness and feasibility of wetland restoration projects

Assessments for the selection of appropriate wetland restoration projects should include the following questions (adapted from the Annex to Resolution VII.17):

- a. Will there be environmental benefits (for example, improved water quantity and quality, reduced eutrophication, preservation of freshwater resources, biodiversity conservation, improved management of “wet resources”, flood control)?
- b. What is the cost effectiveness of the proposed project? Investments and changes should in the longer term be sustainable, not yielding only temporary results. Aim for appropriate costs in the construction phase and appropriate running costs for future maintenance.
- c. What options, advantages or disadvantages will the restored area provide for local people and the region? These may include health conditions, essential food and water resources, increased possibilities for recreation and ecotourism, improved scenic

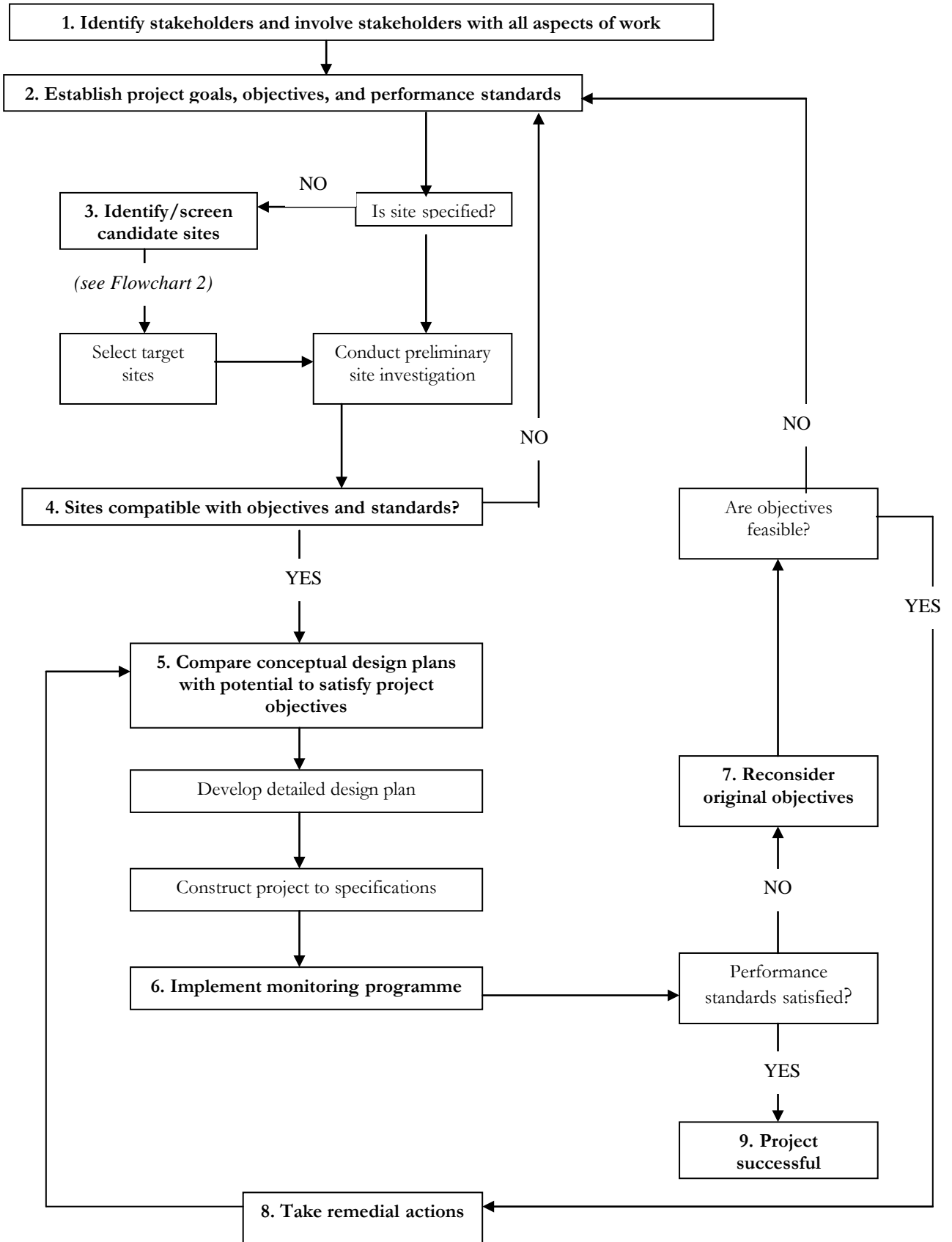
values, educational opportunities, conservation of cultural heritage (historic or religious sites), etc.

- d. What is the ecological potential of the project? What is the present status of the area in terms of habitats and biological values, and in particular will any current features of wetland conservation or biodiversity importance be lost or damaged? How is the area expected to develop with respect to hydrology, geomorphology, water quality, plant and animal communities, etc.
 - e. What is the status of the area in terms of present land use. The situation will differ widely between developed countries, countries with economies in transition, and developing countries, and within such countries depending on local circumstances, with respect to the objectives of restoration and rehabilitation. In particular, marginal lands yielding few benefits in the present situation can often be improved.
 - f. What are the main socio-economic constraints? Is there a positive regional and local interest in realising the project.
 - g. What are the main technical constraints?
28. Site compatibility with goals, objectives, and performance standards: Once a site has been identified, project goals, objectives, and performance standards should be revisited to ascertain compatibility (Box 4 in Flowchart 1).
 29. Project design (Box 5 in Flowchart 1): Because there is almost always more than one way to work toward project objectives, it is useful to consider alternative plans in the early stages of project design. Comparisons should consider rough cost estimates, likelihood of each plan to achieve project objectives, and the viewpoints of all stakeholders. One of these plans should be selected and developed into a detailed design plan that can be used to guide construction activities. Restoration plans should include training programmes to ensure that construction activities are undertaken in an appropriate manner. Consideration should be given to first developing and implementing a pilot project to test and refine the restoration methods.
 30. Monitoring and meeting performance standards (Box 6 in Flowchart 1): Monitoring should focus on performance standards that are linked to project objectives. Effective monitoring programs should consider that all ecosystems undergo constant change and development and should account for both temporal and spatial variability.
 31. When performance standards are not met (Boxes 7 and 8 in Flowchart 1): If performance standards are not met, careful reconsideration of the project is necessary. It may be that original goals, objectives, and performance standards are not feasible, in which case they should be reconsidered. If original goals, objectives, and performance standards are still considered feasible, remedial action should be taken. Remedial action could range from a few simple modifications to existing plans to a complete redesign of the project.
 32. Often, restoration projects break new ground in the understanding of ecosystem processes, and in almost all cases restoration projects should be considered experimental in nature. Therefore, both revision of original goals, objectives, and performance standards and

remedial action should be seen as a necessary part of the restoration process rather than as signs of failure.

33. Successful projects (Box 9 in Flowchart 1): If performance standards are satisfied, the project can be considered successful. However, ongoing stewardship and monitoring will be necessary to maintain this success. Also, stakeholders should re-examine the project to determine if they are still satisfied with the performance standards used to assess success (i.e. to determine if meeting performance standards equates to their sense of successful restoration). If stakeholders are not satisfied with the project outcomes even after performance standards have been met, it may be necessary to begin the entire process again.

Flowchart 1. Guidelines for wetland restoration. Numbers correspond to numbers in parentheses in the text.



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Flowchart 2. Process for identification of potential wetland restoration projects.

Letters correspond to explanations in the text.

