

An Integrated Framework and guidelines for avoiding, mitigating and compensating for wetland losses

(Resolution XI.9, 2012)



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1. Introduction

1. This integrated framework and guidance has been developed by the Ramsar Convention’s Scientific & Technical Review Panel (STRP) in response to the request from the Contracting Parties in Resolution X.10 (2008) to “develop guidance on mitigation of and compensation for losses of wetland area and wetland values, in the context of Resolution X.16 on *A Framework for processes of detecting, reporting and responding to change in wetland ecological character*, including lessons learned from available information on implementation of ‘no net loss’ policies, the ‘urgent national interest’ test, and other aspects relating to situations in which Article 2.5 and 4.2 and/or Resolution VII.24 are relevant”.
2. The starting point for understanding mitigation and compensation for wetland losses is the imperative to seek to avoid wetland losses (or degradation) in the first instance. This

imperative to avoid wetland losses applies to all wetlands and is underscored in the Ramsar Convention text and Resolutions subsequently adopted by the Contracting Parties, including the Strategic Plan 2009-2015 (Resolution X.1, 2008).

3. The preamble of the Convention text states that “wetlands constitute a resource of great economic, cultural, scientific, and recreational value, the loss of which would be irreparable” and that the Contracting Parties desire “to stem the progressive encroachment on and loss of wetlands now and in the future”. Hence avoiding further wetland losses has been the overall objective of the Ramsar Convention since 1971.
4. Article 3.1 of the Convention mandates that Contracting Parties “promote the conservation” of Ramsar Sites. To that end, Article 3.2 of the Convention emphasizes maintaining the ecological character of Ramsar Sites, providing that:

Each Contracting Party shall arrange to be informed at the earliest possible time if the ecological character of any wetland in its territory and included in the List has changed, is changing or is likely to change as the result of technological developments, pollution or other human interference. Information on such changes shall be passed without delay to the organization or government responsible for the continuing bureau duties [i.e., the Ramsar Secretariat] specified in Article 8.

5. Article 4.2 states that if a Contracting Party invokes “its urgent national interest” to delete or restrict a Ramsar Site’s boundaries, then “it should as far as possible compensate for any loss of wetland resources”. Although the Convention contemplates compensation in such a scenario, the overriding and primary duty (in light of Article 3 and the rarity with which Contracting Parties have formally invoked urgent national interest) is to maintain the ecological character of Ramsar Sites and avoid the need for compensation in the first place.
6. Goal 2 of the Strategic Plan 2009-2015 recognizes “those internationally important wetlands that have not yet been formally designated as Ramsar Sites but have been identified through domestic application of the Strategic Framework or an equivalent process” and calls for Ramsar guidance on the maintenance of ecological character to be “applied with a priority upon recognized internationally important wetlands not yet designated as Ramsar Sites.” Accordingly, the principle of maintaining ecological character and avoiding wetland losses applies to those sites as well.
7. With respect to all wetlands, Article 3.1 states that “Contracting Parties shall formulate and implement their planning so as to promote . . . as far as possible the wise use of wetlands in their territory.” Resolution IX.1 Annex A (2005) linked the concepts of wise use and ecological character such that the present definition of “wise use” of wetlands is:

“the maintenance of their ecological character, achieved through the implementation of ecosystem approaches, within the context of sustainable development.”

Thus, in this context as well, the Contracting Parties have recognized a duty to avoid wetland losses.

8. Resolutions and Recommendations of the Conference of the Parties (COP) that discuss mitigation and compensation for wetland losses uniformly emphasize the need to avoid wetland losses in the first instance. These consistently recognize a three-stage approach to responding to threats to wetland ecological character: first, avoidance; second, if that is not possible, mitigating (or minimizing) loss; and third, compensating for any remaining loss (see Box 1).

Box 1. Ramsar Resolutions and Recommendations which recognize the three-stage sequence of avoiding, mitigating (or minimizing), and compensating for wetland losses

Recommendation 2.3 (Annex) (1984): national policies should include “provision of measures to mitigate or exclude any adverse effects of wetland transformation, including compensation measures, if transformation of wetlands is planned”.

Resolution VII.24 (1999): “effective wetland protection involves the conservation of wetlands as a first choice within a three-step mitigation sequence, including avoidance, minimization, and compensation, the latter only as a last resort”.

Resolution X.12 (2008): “to avoid negative impacts, and to mitigate unavoidable effects throughout the supply and production chain”.

Resolution X.17 (Annex) (2008): “Remedial action can take several forms, i.e., *avoidance* (or prevention), *mitigation* (by considering changes to the scale, design, location, siting, process, sequencing, phasing, management and/or monitoring of the proposed activity, as well as restoration or rehabilitation of sites), and *compensation* (often associated with residual impacts after prevention and mitigation). A ‘positive planning approach’ should be used, where avoidance has priority and compensation is used as a last resort measure.”

Resolution X.19 (Annex) (2008): “avoid, minimize or compensate (for example, through conservation offsets) possible negative effects on wetlands of activities within river basins”.

Resolution X.25 (2008): “avoid negative impacts, and where such avoidance is not feasible, to apply as far as possible appropriate mitigation and/or compensation/offset actions, for example through wetland restoration”.

Resolution X.26 (2008): “ensure that impacts on wetland ecosystems and their ecosystem services are avoided, remedied or mitigated as far as possible, and that any unavoidable impacts are sufficiently compensated for in accordance with any applicable national legislation”.

9. Although many COP Resolutions emphasize the concepts of avoiding, mitigating, and compensating for wetland impacts, besides remarks in Resolution IX.6 on contemplating restriction of the boundaries of a designated Ramsar Site, Contracting Parties have not yet adopted guidance concerning when and how to make the choice between different response options concerning wetland losses – that is, when it is appropriate to conclude that avoidance is not possible and thus move to considering mitigation and compensation options. Neither has the available Ramsar guidance clearly linked each response option to supporting implementation once it has been chosen.

10. This Framework has been prepared to provide guidance to Contracting Parties on selecting the appropriate responses to actual or potential wetland loss, and to identify available guidance for implementing each response.

2. Structure of the Framework

2.1 The elements of the Framework

11. Throughout this Framework, the term “wetland loss” is taken to cover both loss of wetland area and/or the loss or degradation of the ecological character of a wetland, regardless of whether or not there is any change to its overall area.
12. The Framework follows the basic three-stage approach set out in the preamble to Resolution VII.24 and other Resolutions:
 - i) **avoidance** of wetland loss, if possible;
 - ii) then *in situ* **mitigation** (minimisation), if avoidance is not possible; and finally
 - iii) **compensation** for any remaining wetland loss – which usually, but not always, takes some form of *ex situ* action.
13. A key precursor step to choosing appropriate response options is the establishment of a baseline condition describing the ecological character of the wetland. (For guidance on describing ecological character, see Resolution X.15 (2008).) This description of the site needs not only to cover its present state but must also provide this information in the context of its natural variability over time, as well as past and projected future changes to its ecological character, including any long-term changes for which the most likely driver is a changing climate.
14. With respect to Ramsar Sites, this information is required as a baseline so as to be able to identify whether a change in ecological character has occurred (or is likely to occur), and if so, whether such a change is too trivial to need to be reported under Article 3.2 or lies beyond any established specified limits of change, in which case it should be addressed through mitigation and/or compensation responses.
15. Monitoring, in line with appropriate management planning practices, is also central to choosing suitable response options. First, a monitoring regime will help identify whether a change in ecological character is occurring. Second, monitoring is necessary to determine whether mitigation and/or compensation responses have been effective or whether further remedial measures are needed to offset wetland losses.
16. The guidance provided in this Framework expands the application of decision criteria (as highlighted in Figure 1) in order to assist in understanding the trigger mechanisms which exist between avoidance, mitigation, and compensation.

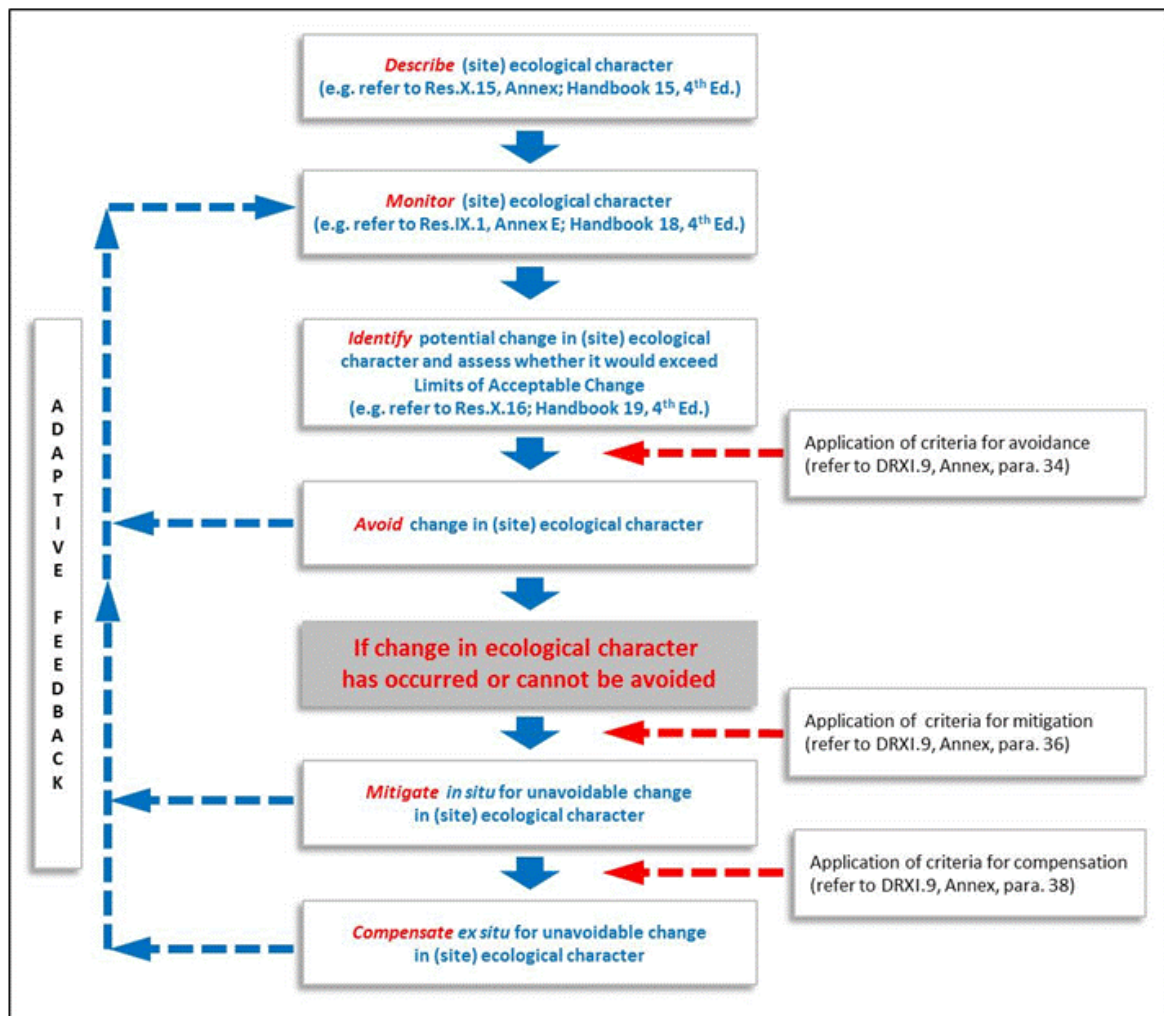


Figure 1. The conceptual framework for avoiding, mitigating and compensating for wetland losses

17. The implications of decisions made at various stages throughout the application of this Framework should follow existing reporting obligations previously adopted by the Convention (Resolution X.16, with further guidance in Handbook 19 (4th Edition)).

2.2 Definitions and descriptions of key terms used in the Framework

18. While COP Resolutions have defined certain key terms relevant to the application of this Framework (e.g., “ecological character”, “restoration”), other terms (e.g., “avoidance”) have not been specifically addressed. Moreover, certain terms have different connotations depending on their context. For example, the meaning of “mitigation” will vary depending on whether one is discussing minimizing wetland impacts associated with a specific activity or project, or actions specifically to reduce greenhouse gas emissions as climate change mitigation.

19. The following definitions apply in this Framework:

Ecological character: “the combination of the ecosystem components, processes and benefits/services that characterise the wetland at a given point in time” (Resolution IX.1 Annex A). In a footnote, the Resolution states that “within this context, ecosystem benefits are defined in accordance with the MA definition of ecosystem services as “the benefits that people receive from ecosystems””.

Change in ecological character: “the human-induced adverse alteration of any ecosystem component, process, and/or ecosystem benefit/service” (Resolution IX.1 Annex A).

Maintenance: the maintenance of the ecological character of a wetland, an affirmative duty that the Ramsar Convention requires with respect to Wetlands of International Importance (Ramsar Sites) and “as far as possible” to all wetlands. To maintain a site’s ecological character, Contracting Parties “are expected to establish management planning and monitoring mechanisms” for Ramsar Sites, and to invoke appropriate response options for resolving change or likely change to the ecological character of such sites”. (Handbook 19, 4th Edition).

Avoidance: Avoiding wetland impacts involves proactive measures to prevent adverse change in a wetland’s ecological character through appropriate regulation, planning or activity design decisions. Examples would include choosing a non-damaging location for a development project, or choosing a “no-project” option where the risks to the maintenance of ecological character are assessed as being too high.

Mitigation: Mitigating wetland impacts refers to reactive practical actions that minimize or reduce *in situ* wetland impacts. Examples of mitigation include “changes to the scale, design, location, siting, process, sequencing, phasing, management and/or monitoring of the proposed activity, as well as restoration or rehabilitation of sites” (Resolution X.17 Annex, paragraph 23). Mitigation actions can take place anywhere, as long as their effect is to reduce the effect on the site where change in ecological character is likely, or the values of the site are affected by those changes. In many cases it may not be appropriate to regard restoration as mitigation, since doing so represents an acknowledgement that impact has already occurred: in such cases the term “compensation” may be a truer reflection of this kind of response.

[*Note:* The interpretation of mitigation in this context does not relate to climate change mitigation.]

Minimization: Minimization is the reduction of effects as far as practicable, taking into account limitations in understanding of the site and effects, techniques for managing effects, ability to alter the impacting activity, and resource availability.

Compensation: Compensating for wetland impacts refers to actions that are intended to offset the residual impacts on wetland ecological character that remain after any mitigation has been achieved. An example of compensation would be an on-site or off-site wetland restoration or creation project, provided it adds value beyond what would have happened otherwise (i.e., relying on an already-planned benefit would not constitute compensation). Contracting Parties have emphasized the fact that it is preferable to compensate for wetland loss with wetlands of a similar type and in the

same local water catchment (Resolution VII.24, 1999), and priority should be given to on-site compensation.

Restoration: As in Resolution VIII.16, *Principles and guidelines for wetland restoration* (2002), these guidelines use the term “restoration” in its broadest sense, which includes both projects that promote a return to or toward original conditions and projects that improve the ecological character of the wetland without necessarily promoting a return to original/reference conditions. Although some Ramsar texts imply a distinction between these two potential scenarios by referring to “rehabilitation” as well as “restoration”, such a distinction in practice is not precise and the two terms are often used interchangeably (Resolution VIII.16, para. 3). The term “restoration” applies to locations where wetland habitat has previously existed or where an existing wetland habitat is degraded.

Creation: the establishment of wetland habitat in locations where no wetland habitat existed previously. It is thus distinct from restoration.

Enhancement: a general expression for any augmentation or improvement in wetland components, processes and/or benefits/services. It often refers to “the modification of specific structural features of an existing wetland to increase one or more functions based on management objectives, typically done by modifying site elevations or the proportion of open water. Although this term implies gain or improvement, a positive change in one wetland function may negatively affect other wetland functions”¹.

“No net loss”: a government policy or strategy that is expressed in terms of no net loss of wetland area and/or ecological character overall, at a given geographical scale (often national). Wetland impacts may be permitted, but compensation (through restoration or creation) is necessary to counterbalance these impacts, not necessarily site-by-site but at the level of the totality of the wetland resource. A no net loss policy may be limited to a particular programme, subset of wetlands, or jurisdiction.

Risk: a prediction of the likelihood and impact of an outcome; usually referring to the likelihood of a variation from the intended or hoped-for outcome.

Risk-based approach: an approach to decision-making which takes account of context-specific judgments about the relative risks associated with different choice options. It includes processes for assessing the magnitude and likelihood of risks (see Resolution VII.10, *Wetland Risk Assessment Framework*, 1999), but in addition it is a way of making explicit the chosen levels of risk which can or cannot be tolerated in given circumstances (the “risk appetite”).

¹ Gwin, S.E., Kentula, M.E. & Schaffer, P.W. 1999. Evaluating the effects of wetland regulation through hydrogeomorphic classification and landscape profiles. *Wetlands* 19(3): 477-489.

3. Deciding on appropriate responses to wetland loss and degradation

3.1 Avoiding wetland loss and degradation

20. Consistent with the philosophy established above, this guidance advocates that avoiding wetland loss and degradation should be the desired outcome, in line with Ramsar Convention commitments.
21. Inherent in this approach is the need to avoid a negative change in the ecological character of a wetland. However, the guidance recognizes that in some instances avoidance may be difficult or impossible to achieve unless a decision is taken to abandon a proposal. Consequently the guidelines set out a risk-based framework to assist in deciding the appropriate response to wetland loss and degradation.
22. Such a framework may be supplemented by undertaking a systematic process to identify and map priority areas for conservation, especially at catchment and river basin levels, in order to promote a more strategic approach to avoidance, mitigation and compensation. However, the absence of such a systematically-derived set of priority areas should not inhibit the application of the guidance on avoidance, mitigation and compensation, nor should it replace the need to undertake detailed assessment of ecological character and value of individual sites.

3.2 Applying risk-based approaches

23. The Framework encourages an overall philosophy for avoiding, mitigating and compensating for loss of wetlands or wetland functions which can be described as a “risk-based approach”. Such an approach is designed to ensure that each decision in a sequence is approached at the outset on the basis of a consideration of the full range of risks associated with the existing situation and with all relevant alternative outcomes.
24. An element of this approach involves identification of the risks that apply in a given instance, and an assessment of the magnitude and likelihood of each of them. Further guidance on processes for this is provided in the *Wetland Risk Assessment Framework* adopted by Resolution VII.10 (see Handbook 18, 4th Edition). It needs to be noted, however, that the risk under consideration extends not just to the ecological responses within a wetland but also to wider and longer-term social or economic issues associated with the decision being made.
25. The risk-based approach can be summarized in a simple risk evaluation matrix based upon “likelihood” and “impact”. Risks are characterized, for example, as low impact/low likelihood, low impact/high likelihood, high impact/low likelihood, etc., with each of these combinations suggesting a different level of response.
26. Figure 2 provides an example of a matrix tool for visualising risk evaluation judgments. In its simplest form, the matrix characterizes an individual risk, or a suite of risks, as “high” or “low” in terms of likelihood/probability and impact/magnitude. (Note that this characterization can be more fine-grained, for example including a “medium” category or breaking down further to a 5-point scale.)

27. The matrix cells then act as prompts to the appropriate type of response. These range from a significant rethinking of plans or activities for unacceptably high combinations of risk factors (the red cell in Figure 2) to a conscious decision to tolerate risks that are deemed to be acceptably low (the green cell in the figure) but which still require mitigation.
28. The level of response is flexible and can be set according to a choice as to what level of risk can or cannot be tolerated in the given circumstances. If the circumstances change, these tolerance limits may change as well. The assessment of risk must also consider cumulative and in-combination effects and not just single issues.

		Likelihood	
		Low	High
Impact	High	Avoid or manage risk (with mitigation, monitoring and contingency arrangements)	Avoid, redirect or significantly modify plans/activities
	Low	Accept the risk (mitigate/monitor)	Avoid or manage risk (with mitigation, monitoring and contingency arrangements)

Figure 2. An example of a risk evaluation matrix

29. Consider these hypothetical examples of the application of this matrix for specific situations:
 - i) An impact assessment for an infrastructure development adjacent to a wetland reveals severe threats of disruption to water flows in the site, which would lead to certain habitat loss and change in ecological character if it were to go ahead. Such risks should prompt the decision-making authority to withhold consent and trigger a search for alternative locations for the development.
 - ii) An increase in livestock grazing intensity on a wet grassland, while in theory having the potential to affect the botanical species composition of the site, may be judged more likely to have effects that are negligible within the natural range of variation of the site. Although there is a risk that this prediction may be wrong, it would be disproportionate to prevent the activity on that basis, and so instead the small risk is consciously accepted. However, given the uncertainty of an adverse effect occurring, a monitoring and contingency plan could be developed and implemented.
30. The risk-based approach therefore goes beyond a mere assessment of risk to include a step which makes explicit the “appetite” for tolerance of risk that has been carefully chosen, taking into account other factors such as cost and timeframe. The approach also offers the

scope for documenting a transparent audit trail of the judgments made about the management of risks.

3.3 Selecting responses for all wetlands

31. The framework for applying a risk-based approach to responding to a change or likely change in the ecological character or loss of a wetland comprises the same three-fold approach to decision making: avoidance, mitigation and compensation.
32. When an activity or project² is either planned or has been completed, it is necessary to understand the implications of the project and any related project activity on the ecological character of the wetland. Decisions made in the implementation of a project should be predicated on an understanding of the associated risk. The decision to move from one stage (for instance, from avoid to mitigate) requires a consideration of all appropriate response options to ensure that changes in ecological character are minimized or obviated entirely.
33. When considering the potential or actual impact of a project or an activity on a wetland it is also necessary to appraise all possible alternatives and outcomes. Traditionally the focus has been on the overall process and the techniques applied to deliver mitigation or compensation. However, an essential element in implementing the conceptual framework is the requirement to be able to evaluate all options before triggering a move from one step in the framework to another (e.g., from avoid to mitigate).
34. Some of the crucial issues and decision-making criteria that require consideration in applying the avoidance-mitigation-compensation framework are considered below.
35. The Framework must be applied in the context set by the Convention that wise use is to be achieved where possible. While compensation does not contribute to wise use of the affected wetland, it may contribute to the wise use of the broader wetland network (e.g., by providing resources necessary for restoration) and the replacement of benefits that are lost due to the unmitigated impacts.

Avoidance

36. To ensure that the ecological character of any wetland is maintained, avoidance of any impact should be the default position. The following decision criteria should be considered in order to evaluate whether avoidance is a realistic response to a likely change in the ecological of a wetland.
 - *Is the site unique and/ or does it provide valuable or irreplaceable ecosystem services/ benefits?*
The ecological character of a wetland may be significant and/ or provide valuable and/ or irreplaceable ecosystem services, in which case any change in ecological character should be considered unacceptable. In this situation, a cost/benefit analysis that includes a risk-based assessment would indicate that the activity should be abandoned or relocated to avoid any direct or indirect impact on the wetland.

² 'Project' in this context relates to any activity, such as a change in land use, the construction of infrastructure, a variation in land use or a change in water quality or quantity, which may impact upon a wetland and result in a change of ecological character.

- *Have other localities been examined for the proposed activity or is the proposed activity wetland-dependent?*

In certain circumstances, it may be possible to undertake the proposed activity in an alternative location or at a different site that does not impact a wetland. A comprehensive assessment of other potential sites should be conducted in order to determine if changing the location of the activity would result in avoiding change in the ecological character of the wetland.

- *Have design modifications been considered to avoid wetland losses?*

In certain circumstances, a review of the activity design should consider modifications or alternative methods that would result in the avoidance of change in the ecological character of the wetland. All viable design modifications should be considered during this process.

- *Have the economic values of lost or altered ecosystem services been considered in the project cost-benefit analysis?*

The wetland will be providing benefits to a variety of stakeholders through the delivery of ecosystem services, and these ecosystem services may have an economic value. Any change in ecological character will make a resultant change in ecosystem services and consequently may have an economic impact. The value of any change in the values derived from ecosystem services needs to be considered in the project development phase.

- *What are the costs and efficacy of mitigation/compensation measures if the proposed activity is implemented?*

The financial costs of mitigating and compensating for the change in ecological character of the wetland should be considered seriously, including an assessment of the implications for ecosystem services. Likewise, the efficacy of any measures in achieving the desired outcomes needs to be evaluated rigorously through a risk-based approach. If the cost and effectiveness of these measures are unacceptable, avoidance should be adopted as the default strategy.

- *Have both direct and indirect impacts on the wetland been considered?*

A project might result in both direct impacts, such as infilling of part of a wetland to facilitate a construction project, and indirect impacts, such as pollution of a wetland some distance downstream from where the project is being implemented. The implications of all impacts and their potential to change ecological character need to be assessed fully to ensure that a change in ecological character is avoided.

- *Have cumulative or in-combination impacts on the wetland been considered?*

It is possible that in isolation the impact of a project may be insufficient to result in a change of ecological character within the specified limits of change. The project might not be an isolated event, however, and its potential impact needs to be considered in association with all other projects or activities which might have an impact on the wetland.

- *Has an assessment been made of all the risks and benefits associated with the project?*

There will be risks and benefits associated with all projects, and usually these will have an economic dimension, but there may also be moral, ethical or other considerations as well. Before proceeding with a project which could change the ecological character of a wetland, a risk-based approach should be pursued to understand fully the implication of any possible change in ecological character.

Box 2. Avoidance of change in ecological character. Case study: The Severn Estuary, UK

The Severn Estuary Ramsar Site in the west of England has one of the largest tidal ranges in the world and is one of Europe's most important wildlife habitats. The estuary, and the rivers that feed into it, contain and support a wealth of wildlife. Its tidal waters, saltmarshes and mudflats are used by 69,000 waterbirds each winter. The diverse habitats support over 100 fish species and vast numbers of invertebrates, and the Estuary is a vital migration route for migratory fish, including Atlantic salmon, sea trout and eels, and a significant contributor to the economy of the area.

Schemes to harness the tidal energy of the Severn have been promoted for more than a hundred years. A report by the UK Sustainable Development Commission published in October 2007 suggested that the Severn Estuary could produce 5% of the UK's electricity needs. The preferred option promoted by a consortium of developers was for a 10-mile tidal barrage which would have altered some 160km² of estuarine habitats. Many conservation groups raised concerns regarding the fundamental changes that a large-scale barrage would have on the ecological character of the estuary. Doubts were also raised regarding the cost-benefit calculations and the long-term economic returns from a barrage.

Following a period of feasibility studies, research and consultation, the UK government concluded in October 2010 that it did not see a strategic case for public investment in a tidal energy scheme in the Severn estuary. Whilst not wanting to rule out future proposals, the government acknowledged that the costs and risks for the taxpayer and energy consumer would be excessive compared to other low-carbon energy options. The government expressed the view that when a risk-based approach is applied, other options, such as the expansion of wind energy, carbon capture and storage, and nuclear power without public subsidy, represented a better deal for taxpayers and consumers. Hence the decision to avoid changes to the ecological character of an internationally important wetland site was made on socio-economic grounds rather than purely ecological criteria.

Source: www.decc.gov.uk/assets/decc/What%20we%20do/UK%20energy%20supply/Energy%20mix/Renewable%20energy/severn-tp/621-severn-tidal-power-feasibility-study-conclusions-a.pdf

Box 3. Understanding economic benefits to avoid wetland loss. Case study: Yamuna River floodplain, India

Around 3,250 hectares of floodplain between the Yamuna River and the landmass in Delhi offer benefits such as provision of water, fodder and other materials, fisheries, and recreation. Faced with pressures to convert the floodplain into areas suitable for housing development and industry, the decision makers, whilst acknowledging the ecological role of the floodplain, were not able to establish sufficient justification for conserving it without economic valuation of the ecosystem services to enable a cost-benefit analysis of conversion.

Value estimates for a range of services totaled US\$ 843/ha/year (2007 prices). The embankment of the Yamuna would virtually dry the floodplain, causing the disappearance of those services. These ecosystem benefits exceeded the opportunity costs of conservation (estimated from the land price, assumed to reflect the discounted value of 'development' benefits) for a range of discount rates from 2 percent to 12 percent, justifying the maintenance of the floodplain. The Delhi government halted the embankment plan of the Yamuna River floodplain until further order.

Source: Kumar, P.; Babu, C. R.; Sharma, S. R.; Love, A. and Prasad, L. (2001) Valuation of Ecosystem Services: A Case Study of Yamuna Floodplain in the Corridors of Delhi. Under the World Bank Aided Environmental Management Capacity Building Programme. Mimeograph, IEG, Delhi.

Mitigation

37. Where a risk-based evaluation has indicated that a project can proceed, but that a change in the ecological character is likely, and the risk associated with this is considered acceptable, then appropriate proactive mitigation should be undertaken. In certain circumstances a change in ecological character may have already been detected and reactive mitigation needs to be undertaken.
38. If a change in the ecological character of a wetland has been detected or is likely to be detected, the following decision criteria should be considered:
 - *Are the costs and risks associated with effective mitigation measures considered to be too high?*
A risk-based approach may consider the cost of mitigation to be prohibitive. In this scenario a decision needs to be made as to whether this is appropriate or the party should refrain from implementing the activity, with avoidance becoming the best response.
 - *Is it possible to mitigate the impacts of the activity in a practical and effective manner?*
Where mitigation is possible, maximum consideration must be given to outcomes that are self-sustaining and maintain the ecological character of the wetland. The criteria and timelines for successful mitigation should be clear and practical.
 - *Are the mitigation activities going to fully minimize the impacts?*
In some scenarios it may not be possible to fully mitigate impacts on a wetland and, consequently, residual impacts may remain. Attempts should be made to ensure that the temporal extent, magnitude and scale of any residual impacts are minimized. Where residual impacts exist appropriate compensation measures should be provided.

Box 4. Mitigation. Case study: Gasbol (Bolivia-Brazil Gas Pipeline)

Gasbol is a 3,150-km gas pipeline between Brazil and Bolivia. The project, which was partly financed by the World Bank (WB), starts in Rio Grande, Bolivia, extending west and then south to Porto Alegre, Brazil. WB policy requires that all WB-financed infrastructure projects conduct an Environmental Assessment (EA). Projects must also comply with the WB Natural Habitats

(critical and non-critical) policy, and they must avoid significant modification to critical habitats. For non-critical habitats, avoidance is still recommended unless there are no feasible alternatives. Where impacts are unavoidable, mitigation or compensation measures are required.

To avoid certain sensitive ecosystems, the pipeline's route was modified. To reduce the size of impacts, the width of the right of way (ROW) was narrowed in many transects. In Brazil, the ROW width was reduced from 30 to 20 meters.

As described in Quintero (2007), mitigation measures to minimize unavoidable impacts included:

- *Manual tree removal along the ROW:* Trees were manually removed with chain saws to ensure that they were felled within the ROW, avoiding damage to surrounding vegetation.
- *Pushing and pulling method for wetlands:* State-of-the-art techniques were used to install the pipeline across the wetlands. The pushing and pulling method is used during the rainy season. It uses a preassembled section of pipe which is floated into position over an inundated trench. The buoys are removed and the pipe, coated with concrete jackets, sinks into the ditch. This method requires less clearing than conventional methods, because the construction space is limited to that required to allow the backhoe to cross the wetland to stockpile excavated soil. In contrast, under conventional methods the entire area is usually cleared during the dry season in order to set the pipe.
- *Drilling under river beds:* Similar special works were commissioned for the crossing of 13 rivers to avoid negative impacts on vegetation and water quality. Horizontal drilling techniques were used to tunnel under river beds, minimizing disturbance to riparian vegetation and protecting the pipe from pipeline scouring.
- *On-site restoration:* A 13-meter-wide strip along the ROW of the pipeline was revegetated and the trenches were refilled after construction.

The Gasbol project has received the International Association of Impact Assessment's Environmental Award for its EA and the World Bank's 2001 Green Award.

Source: Quintero, J.D. 2007. Mainstreaming Conservation in Infrastructure Projects: Case Studies from Latin America.

Compensation

39. Where there are residual post-mitigation impacts, it is necessary to compensate for the resultant change in ecological character, as agreed by the Parties in Resolution VII.24, *Compensation for lost wetland habitats and other functions* (1999). Any such action should be *ex situ* and appropriate to offset the residual impacts.
40. The following decision criteria require consideration during the development and implementation of compensation measures:
 - *Is the compensation type-for-type?*
The change of ecological character of one type of wetland (for instance, an area of saltmarsh) should be compensated, as appropriate, by the protection, enhancement,

restoration or creation of a similar wetland type (Resolution VII.24), in this case another area of saltmarsh rather than, for example, an area of freshwater marsh.

- *Is the compensation function-for-function, component-for-component, or area-for-area?*
 The residual change in ecological character may result in a loss of area and/or a loss of function or loss of provision of ecosystem services. The compensation provided should address the areal extent, significant ecosystem components, and the functional performance of the wetland. Therefore, it is necessary to understand the range of ecosystem services provided by the wetland, its physical size, and the type of biodiversity a wetland supports prior to developing compensatory habitat.
- *Where should compensation be located?*
 The location of any compensatory wetland habitat is important. Ideally it should be in close proximity to the impacted wetland and within the same hydrological catchment or coastal zone. Where compensation measures require habitat restoration or creation, the existing ecological character of the proposed restoration or creation site needs to be assessed to ensure that a) other existing important wetland values and services are not damaged, and b) other non-wetland impacts are not generated.
- *How can compensation be achieved?*
 Compensation may be achieved through the restoration, enhancement, and/or creation of wetlands. The compensation measures must address cumulative impacts on both area and function and promote integrity and resilience through a detailed scientific understanding of risks and uncertainties. The timing of implementing compensatory measures is important. Compensation must be established in advance of, or at least in consideration of, the timing of the proposed impacts. The monitoring of any compensatory measures needs to be undertaken to evaluate whether the residual impact to the ecological character has been adequately compensated, or whether further compensation provision proves to be necessary. Securing the conservation of other existing wetlands, for example through increasing statutory protection for maintaining the ecological character of another wetland, whilst covered under the terms of Article 4.2, should generally be considered a less appropriate compensation option under the overall terms of the Convention, since all Parties have already committed themselves to the wise use, through the maintenance of ecological character, of all wetlands.
- *How can long-term compensation be implemented?*
 The security of any long-term success will depend on appropriate stewardship and resourcing. When considering compensation, the ability to ensure that the necessary technical, financial, management and legislative capabilities will exist into the future needs to be considered with sufficient care and consideration. As with any wetland restoration, enhancement or creation, full local community engagement, support and stewardship is a key prerequisite for long-term success (in line with Resolutions VII.8, *Guidelines for establishing and strengthening local communities' and indigenous people's participation in the management of wetlands* (1999), and VIII.16, *Principles and guidelines for wetland restoration* (2002)).
- *Are the costs and risks associated with effective compensation considered to be too high?*

A risk-based approach may consider the full cost of compensation, including both initial or capital costs and the long-term cost to secure the future ecological character of the area in perpetuity, to be prohibitive. Alternatively, because of ecosystem complexity, irreplaceability and/or scientific uncertainty the risk of failure to successfully compensate an adverse decision may be unacceptably high. In these scenarios a decision needs to be made as to whether compensation is appropriate or instead the party should refrain from implementing the activity, with avoidance becoming the appropriate strategy.

3.4 Additional responses for Ramsar Sites

41. Under Article 2 of the Convention, Contracting Parties have committed themselves to designating suitable wetlands within their territories for inclusion on the List of Wetlands of International Importance. The legal status of Ramsar Sites will be different to other wetlands in a territory (Article 3). For instance, if a Party does not follow prescribed guidance in the case of a designated Ramsar Site (e.g., Article 3.2 reporting in the event of a change in ecological character), then it is in breach of the Convention itself – if a Party does not follow guidance in the case of other wetlands (Article 3.1), however, it is only breaching the spirit of a non-binding good practice principle. Consequently, under the avoid-mitigate-compensate framework there are additional commitments, and hence responses required, for Ramsar Sites concerning wetland loss and degradation. Guidance on these responses (including reporting obligations; see also section 4.8) has been adopted in Resolution X.16, *A Framework for processes of detecting, reporting and responding to change in wetland ecological character* (2008), included in Handbook 19, 4th edition, 2010.
42. Article 2.5 of the Ramsar Convention states that “any Contracting Party shall have the right . . . because of its urgent national interests, to delete or restrict the boundaries of wetlands already included by it in the List”. Following from that, Article 4.2 of the Convention states that “where a Contracting Party in its urgent national interest deletes or restricts the boundaries of a wetland included in the List, it should as far as possible compensate for any loss of wetland resources.” General guidance for Contracting Parties for interpreting “urgent national interests” under Article 2.5 of the Convention and considering compensation under Article 4.2 was adopted by the Parties in Resolution VIII.20, *General guidance for interpreting “urgent national interests” under Article 2.5 of the Convention and considering compensation under Article 4.2* (2002).
43. Furthermore, Resolutions 5.1 and VII.24 respectively make the points that “Contracting Parties will aim to meet their commitments under the Convention through the following actions: . . . restore degraded wetlands and compensate for lost wetlands” (under a heading of Wetlands of International Importance), and that Contracting Parties are urged to “take all practicable measures for compensating any loss of wetland functions, attributes and values, both in quality and surface area, caused by human activities”.
44. The overall decision-making framework for avoiding, mitigating and compensating for wetland loss applies both to already-designated Ramsar Sites and as far as possible to all other wetlands in the territory of the Contracting Party according to Article 3.1 of the Convention.
45. A range of potential scenarios are illustrated in Figure 3. Concerning site area, the deletion of a site or a restriction in the boundary of a Ramsar Site (square 1) is illustrated in (2) and

- (3). The appropriate response to the development of compensation measures for deleting or restricting the boundaries of wetlands on the Ramsar List should follow the guidance provided in section 3.2 of this Framework and in Resolution VIII.20 (Handbook 19, 4th edition).
46. Further guidance for consideration of the deletion or restriction of the boundaries of a listed Ramsar Site for reasons of other than “urgent national interest” is provided in the Annex to Resolution IX.6, *Guidance for addressing Ramsar sites or parts of sites which no longer meet the Criteria for designation* (2005).
47. It should be noted that the trigger for compensation under Article 4.2 is not the ecological character change itself, but rather the administrative decision that the Ramsar Site designation should be changed because the ecological change is considered to be irreversible. This is logical, since until such a conclusion has been reached, the correct response to character change should be to endeavour to reverse it.
48. If, however, irreversible negative ecological character changes have occurred or will occur as the result of activities on- or off-site, and yet no decision is taken to amend or de-List the designated area (square 4 in Figure 3), the Convention text does not expressly require compensation, other than the general terms of Resolution VII.24. Nevertheless, in such cases, Resolution IX.6 calls upon Contracting Parties to make “at least equivalent provision of compensation” when there is unavoidable loss of ecological character at a Ramsar Site.³

³ Another, albeit rare, scenario in which compensation is necessary for a Ramsar Site may occur when (in accordance with Resolution 5.3, 1993), “following consultation between the Convention [Secretariat] and the Contracting Party concerned, it is agreed that a site failed at the time of designation to qualify under any of the criteria, and that there is no possibility of extension, enhancement, or restoration of its functions or values, it shall instruct the Convention [Secretariat] to remove the site from the List and shall apply the provisions for compensation, as provided in Article 4.2 of the Convention.”

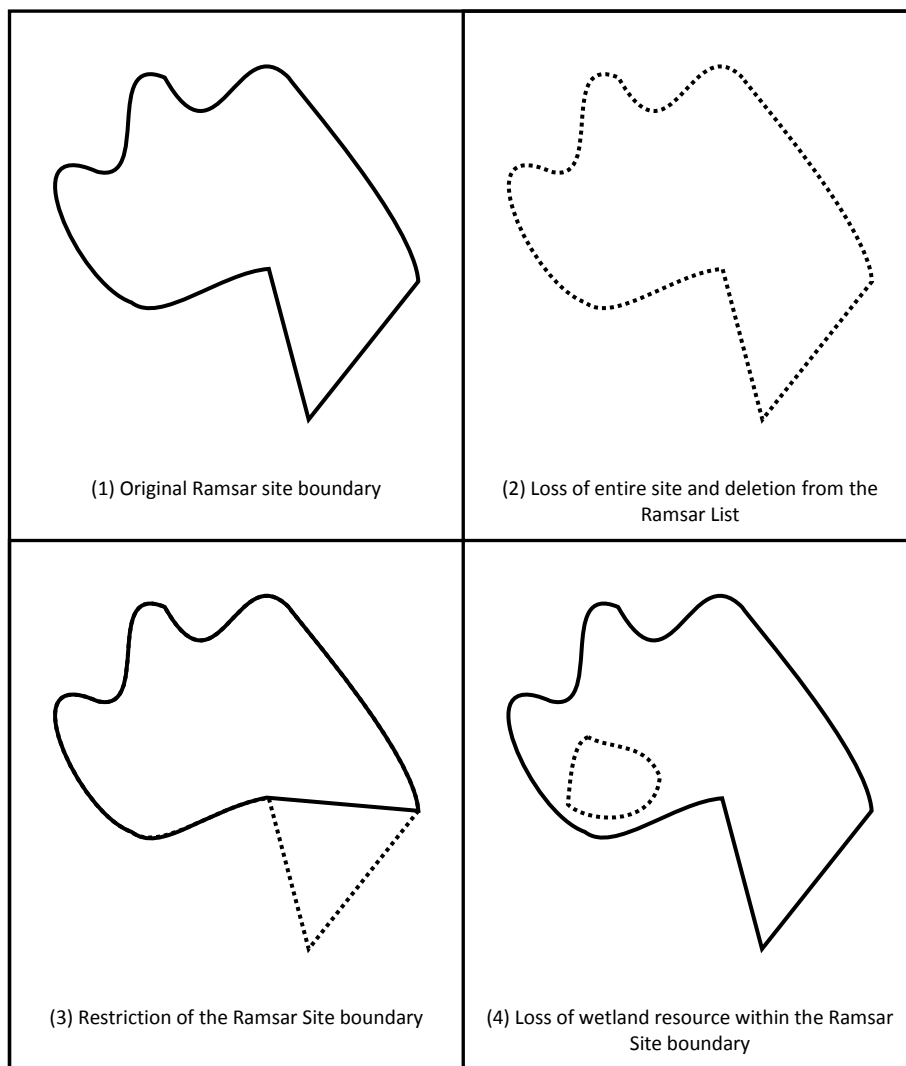


Figure 3. Scenarios for changes to a Ramsar site

3.5 Additional responses for sites that qualify for Ramsar site designation

49. Under the Ramsar Strategic Plan 2009-2015, Strategic Goal 2 seeks to “develop and maintain an international network of wetlands that are important for the conservation of global biological diversity, including waterbird flyways and fish populations and for sustaining human life, by ensuring that all Contracting Parties appropriately implement the Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance and by appropriate management and wise use of those internationally important wetlands that are not yet formally designated as Ramsar sites but have been identified as qualifying through domestic application of the Strategic Framework or an equivalent process.”
50. This Goal is advanced further through Strategy 2.7 on the management of other internationally important wetlands, which states: “Appropriate management and wise use achieved for those internationally important wetlands that have not yet been formally designated as Ramsar sites but have been identified through domestic application of the Strategic Framework or an equivalent process.”

51. The implication in the Strategic Plan is that all sites which have been recognized through a domestic or equivalent process as being “internationally important” under the terms of the *Strategic Framework and guidelines for the future development of the List of Wetlands of International Importance* but which have not been formally designated as Ramsar Sites should be considered, in terms of the maintenance of their ecological character, in the same way as sites which have been placed on the List of Wetlands of International Importance.
52. Consequently the response options and the decision criteria applied to these sites should be identical to those applied to sites which are designated on the List of Wetlands of International Importance (section 3.4 above).

4. Principles and guidance for avoiding, mitigating and compensating for wetland losses

4.1 Introduction

53. Whilst the focus of this Framework is upon avoidance, mitigation and compensation, other aspects of the issue of maintenance of the ecological character of wetlands are considered within these overall principles and guidance.
54. In order to detect change, the ecological character of the wetland first needs to have been described, limits of acceptable change in ecological character defined, and then appropriate monitoring is required to ensure that any change is identified and characterized. Without these essential elements, it is difficult to make an informed decision regarding the risk of implementing various response options to change or likely change in ecological character.
55. Key principles and guidance for implementation of the overall Framework are elaborated below and follow the *Framework for processes of detecting, reporting and responding to change in wetland ecological character* adopted as Resolution X.16 (Handbook 19, 4th edition, 2010).

4.2 Describing wetland ecological character

56. As noted above, the current definition of “ecological character” (paragraph 15 of Resolution IX.1 Annex A) is: “Ecological character is the combination of the ecosystem components, processes and benefits⁴/services that characterise the wetland at a given point in time.”
57. Whilst a definition of “ecological character” is helpful, it is also important to be able to describe the particular ecological character of a wetland as a key element of an effective management planning process, including monitoring, as is set out in the wetland management planning guidance in Ramsar Wise Use Handbook 18 (4th edition.). It also follows that if human-induced adverse change in the ecological character of a wetland occurs, a baseline description of ecological character is needed against which to assess change and consequently to consider avoidance, mitigation and compensation.

⁴ In this context, ecosystem benefits are defined in accordance with the MA [Millennium Ecosystem Assessment] definition of ecosystem services as “the benefits that people receive from ecosystems”.

58. The Contracting Parties have adopted guidance which has moved beyond the *definition* of the concept to a treatment of the *constituent parts of what goes to make up* ecological character, and which can be applied to any wetland. Guidelines on describing ecological character of a wetland, including its components, processes and services, are provided in the annex to Resolution X.15, *Describing the ecological character of wetlands, and data needs and formats for core inventory* (2008).
59. Consistent with Resolution X.15, this ecological character description structure and fields have now also been incorporated into the Ramsar Site Information Sheet (RIS) – 2012 revision adopted by Resolution XI.8.

4.3 Monitoring and early warning indicators

60. In order to detect actual or potential changes in ecological character, regular monitoring is required. Monitoring is defined in the Ramsar *Framework for Wetland Inventory* (Resolution VIII.6, 2002) as the “collection of specific information for management purposes in response to hypotheses derived from assessment activities, and the use of these monitoring results for implementing management. (Note that the collection of time-series information that is not hypothesis-driven from wetland assessment should be termed surveillance rather than monitoring, as outlined in Resolution VI.1.)”
61. The *Additional Guidance for the implementation of the wise use concept* (Resolution 5.6, 1993) also pointed out that monitoring does not automatically require sophisticated technology or high investment and can be carried out at different levels of intensity. It should be emphasised that there are many different monitoring techniques available and that each Contracting Party should select the technique(s) most appropriate to its priorities and available resources.
62. A monitoring programme should, ideally, be an integral part of a site-specific wetland management plan, as set out in Resolution VIII.14, *New Guidelines for management planning for Ramsar sites and other wetlands*, and described further in Ramsar Handbook 18 (4th edition, 2010). Where a management plan does not yet exist, it is still possible to implement a monitoring programme; without the framework of a management plan, however, it will be difficult to implement the results of monitoring effectively.
63. In any monitoring programme, it is useful to develop early warning indicators. The underlying concept of early warning indicators is that effects can be detected which are precursors to, or indicate the onset of, actual environmental impacts. Whilst such ‘early warnings’ may not necessarily provide firm evidence of larger-scale environmental degradation, they present an opportunity to determine whether intervention or further investigation is warranted. As such, early warning indicators can be defined as “the measurable biological, physical or chemical responses to a particular stress, preceding the occurrence of potentially significant adverse effects on the system of interest”. Further information on early warning indicators is also provided in Ramsar Handbook 18 (4th edition).
64. The ecological relevance (ability of the measure to predict future ecological change of state through documented correlation and/or causation) of an early warning indicator should be considered, but at the same time, the concepts of early warning and ecological relevance

can conflict. The types of biological responses that can be measured, and their relationship to ecological relevance and early warning capability, is generalised in Figure 4.

65. As an example, biomarker responses can offer exceptional early warning of potential adverse effects, but there exists very little evidence that observed biomarker responses result, or culminate in, adverse effects at an individual level, let alone at the population, community or ecosystem level. Therefore, biomarker responses cannot be considered ecologically relevant because they have low predictive power for the future ecological changes or condition. If the primary assessment objective is that of early detection, then it is likely that it will be at the expense of ecological relevance, while the opposite would probably apply if ecological relevance of effects was prioritized.

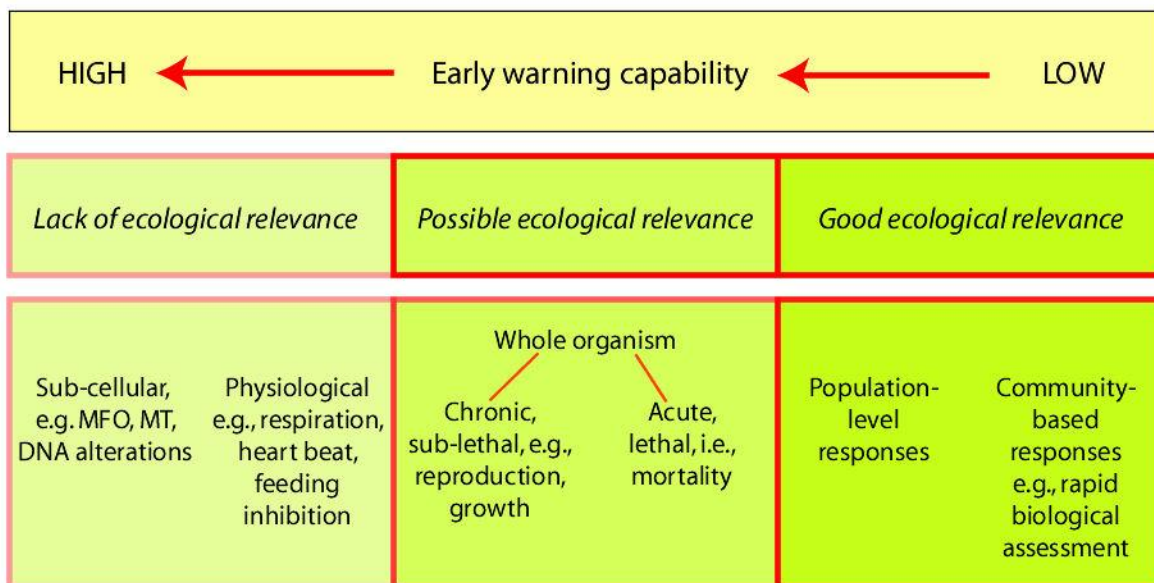


Figure 4. Relationship of ecological relevance and early warning capability to measurable biological responses (from Resolution VII.10, Handbook 18, 4th edition, 2010)

Ideal attributes of early warning indicators

66. The annex to Resolution VII.10 sets out a clear strategy for developing early warning indicators. To have potential as an early warning indicator, a particular response should be:
- 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 their occurring, an early warning indicator should be sensitive to low levels 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 it should 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 able to be measured using a standard procedure with known reliability and low measurement error;
 - j) **constant in space and time:** it should be capable of detecting small change and of clearly distinguishing that a response is caused by some anthropogenic source, not by natural factors as part of the natural background (that is, high signal to noise ratio); and
 - k) **nondestructive:** measurement of the indicator should not be damaging to the ecosystem being assessed.

4.4 Avoiding change in wetland ecological character

- 67. As explained above, Ramsar Contracting Parties through their decisions of the COP have consistently endorsed the notion that wetland impacts should be avoided as the principal step in any decision-making process in matters of environmental impact assessments, wetlands and river basin management, and sector-specific activities.
- 68. For example, the Annex to Resolution X.17 in providing advice on environmental impact assessments observes that “remedial action can take several forms, i.e., *avoidance* (or prevention), *mitigation* (by considering changes to the scale, design, location, siting, process, sequencing, phasing, management and/or monitoring of the proposed activity, as well as restoration or rehabilitation of sites), and *compensation* (often associated with residual impacts after prevention and mitigation). A ‘positive planning approach’ should be used, where avoidance has priority and compensation is used as a last resort measure. One should acknowledge that compensation will not always be possible: there are cases where it is appropriate to reject a development proposal on grounds of irreversible damage to, or irreplaceable loss of, biodiversity.”
- 69. Resolution X.19 on wetlands and river basin management also identifies avoidance as the priority, calling on wetlands and river basin management policy to address “the need to avoid, minimize or compensate (for example, through conservation offsets) possible negative effects on wetlands of activities within river basins.”
- 70. Sector-specific guidance on biofuels and extractive industries also recognize avoidance as the priority under the Convention. Resolution X.25 calls on Contracting Parties “to seek to avoid negative impacts, and where such avoidance is not feasible, to apply as far as possible appropriate mitigation and/or compensation/offset actions, for example through wetland restoration”. Similarly, Resolution X.26 recognizes “the need, in implementing policies for the wise use of all wetlands, including those in the Ramsar List, and in a context of objectives for sustainable development, to avoid, minimize or mitigate the negative impacts of economic development on the ecological character of wetlands” and

accordingly urges Contracting Parties to “review and revise regulatory and permitting procedures related to extractive industrial activities, in order to ensure that impacts on wetland ecosystems and their ecosystem services are avoided, remedied or mitigated as far as possible, and that any unavoidable impacts are sufficiently compensated for in accordance with any applicable national legislation”.

71. Contracting Parties have also long emphasized that “restoration schemes” – and thus mitigation and compensation efforts – “must not weaken efforts to conserve existing natural systems” (Recommendation 4.1, 1990).

4.5 Mitigating for loss of wetland ecological character

72. When all options for avoiding change in ecological character have demonstrably been exhausted, the next step in the sequence which may be considered is the taking of practical actions to minimize or reduce *in situ* wetland impacts. Such mitigation actions can take place anywhere (including, for example, upstream in the catchment), as long as their effect is realised in the site where change in ecological character is likely. Judgments about impacts should be based on appropriate methods of impact assessment.
73. Ramsar guidance on Environmental Impact Assessment (Resolution X.17) refers to the purpose of mitigation as being to look for ways to achieve the objectives of a project while reducing negative impacts to acceptable levels. Typically this will involve the incorporation of safeguards in the design of the project, and the guidance describes this as potentially including “changes to the scale, design, location, siting, process, sequencing, phasing, management and/or monitoring of the proposed activity, as well as restoration or rehabilitation of sites”.
74. The guidance further observes that:
 - i) “mitigation requires a joint effort of the proponent, planners, engineers, ecologists and other specialists, to arrive at the best practicable environmental option”;
 - ii) options should be examined at early scoping stages in the process so that their feasibility can be evaluated before choices become more constrained; and
 - iii) “mitigation measures must be identified and described in detail, including an analysis of their likely success and realistic potential to offset adverse project impacts”. National policy and legal systems may specify particular requirements in individual countries.
75. A common method of framing and applying mitigation measures is by means of conditions or covenants attached to project or plan consents. As well as specifying the measures to be undertaken, these can also enable mechanisms for accountability and oversight to be specified where appropriate. In some cases this can be formulated as an agreement between those responsible for implementing and assessing the mitigation.
76. Mitigation can also on occasion be achieved by use of spatial management approaches, spatially segmenting activities, so that location-specific risks are mitigated.

77. A mitigation plan may often best be implemented through an “adaptable management” approach, whereby adjustments and corrections can be applied as necessary in the light of feedback from monitoring and testing. Resolution VIII.14 (2005), in the *New Guidelines for management planning for Ramsar sites and other wetlands*, includes some guidance on adaptable management, outlining such a process as follows:
- i) a decision is made about what should be achieved (i.e., quantified management objectives are prepared for the important features);
 - ii) appropriate management, based on the best available information, is implemented to achieve the objectives;
 - iii) the features are monitored in order to determine the extent to which they are meeting the objectives;
 - iv) if objectives are not being met, management is modified;
 - v) monitoring is continued to determine if the modified management is meeting the objectives, and step iv) is repeated for any further adjustments, as necessary.

4.6 Compensating for loss of wetland ecological character

78. Where residual post-mitigation impacts remain or are expected to occur (or when Article 2.5 “urgent national interest” is invoked for a listed Ramsar Site), the next step in the sequence is to compensate for the resulting change in ecological character. Note, however, that the COP has stressed the point (in Resolutions VII.17, para. 10, and VIII.16, para. 10) that restoration or creation of wetlands cannot replace the loss or degradation of natural wetlands. This is true in relation to the ecological values of such wetlands, but in many cases it is equally true, or even more so, in relation to those cultural values that are site-specific in nature (see also Resolution IX.21, *Taking into account the cultural values of wetlands*).
79. Contracting Parties have also highlighted the fact that it is preferable to compensate for wetland loss with wetlands of a similar type and in the same local water catchment (Resolution VII.24 and the annex to Resolution VIII.20).

Wetland restoration as a response option

80. Restoration constitutes a potential response to change or likely change in ecological character in situations where residual impacts remain after avoidance or mitigation efforts.
81. In 2002, the Conference of the Parties adopted *Principles and guidelines for wetland restoration* (Resolution VIII.16). The concepts embedded in those principles apply equally to the application of restoration as a response option to a loss of wetland ecological character.
82. When choosing wetland restoration as a response option, it is essential that a clear understanding and statement of goals, objectives, and performance standards for restoration projects are defined. As indicated in Ramsar Resolution VII.17 on restoration as an element of national planning for wetland conservation and wise use, those goals and objectives should recognize that wetlands perform multiple functions. If it is hoped that a project will promote a return to pre-disturbance conditions, that should be stated as part of the project goals, and more detailed information on exactly what this means should be incorporated into project objectives. It should be noted, however, that not all restoration projects are intended to promote a return to pre-disturbance conditions and that a return

to pre-disturbance conditions is not necessarily implied by the word “restoration” as it is used in the *Principles and guidelines for wetland restoration*.

83. Moreover, it must be recognized that with a changing climate it is likely to become increasingly unlikely that restoration will achieve a historical reference condition. Rather, restoration goals and objectives should be designed to be as far as possible “climate-proof” and take into account projections of future climate change.

Wetland creation as a response option

84. In some situations it may be feasible to create wetlands on land that has never been wetland in order to provide compensation or even to assist in mitigating changes in ecological character.
85. Broadly, the concepts and approaches embedded in the *Principles and guidelines for wetland restoration* are also applicable to wetland creation, but consideration should also be given to the present and historic land use of an area in order to evaluate the appropriateness of creating wetlands in that location. It should also be noted that because of the lack of effectiveness of wetland creation efforts, some Contracting Parties, such as the USA, have adopted a policy preference for restoration over creation⁵.

Applying a “no net loss” policy

86. A “no net loss” policy may express a preferred sequence of avoiding wetland impacts, mitigating unavoidable wetland impacts *in situ*, and/or compensating for or offsetting any remaining impacts *ex situ*. Thus, wetland impacts are permitted, but compensation (often through restoration) is a key element.
87. Some Contracting Parties have expressly adopted some form of a “no net loss” policy, including Australia (Western Australia position statement); the Bahamas (national wetlands policy); Canada (federal and provincial laws and policies); China (Hong Kong’s Mai Po Inner Deep Bay Ramsar Site); Rwanda (Marshlands Law); Spain (national wetland policy); Trinidad and Tobago (national wetland conservation policy); and the United States (federal and state laws and policies).
88. In some countries, such as the Bahamas, Canada, and Trinidad and Tobago, the no net loss policy was adopted by government with a view toward implementing the Ramsar Convention. In other cases, such as the United States, the Ramsar Convention was not a factor in the policy’s adoption.
89. Although a “no net loss” policy may be consistent with the objectives of the Ramsar Convention, it is important to note, on the other hand, that a “no loss” approach is built into the Convention text itself. Indeed, as mentioned above, the preamble states that “wetlands constitute a resource of great economic, cultural, scientific, and recreational value, the loss of which would be irreparable” and that the Contracting Parties desire “to stem the progressive encroachment on and loss of wetlands now and in the future,” thus suggesting that avoiding further wetland losses *in situ* is of paramount importance.

⁵ U.S. Army Corps of Engineers & U.S. Environmental Protection Agency. 2008. Compensatory Mitigation for Losses of Aquatic Resources, *Federal Register* 73(70): 19594-19705.

90. With respect to Ramsar Sites, the Convention again emphasizes a “no loss” approach. Contracting Parties must “promote the conservation” of Ramsar Sites and (as discussed in section 3.4) may delete or restrict the boundary of a Ramsar Site upon the formal invocation of “urgent national interest” (Article 2.5) or consistent with guidance included in Resolution IX.6, *Guidance for addressing Ramsar sites or parts of sites which no longer meet the Criteria for designation*. If a Contracting Party does invoke its urgent national interest to delete or restrict a Ramsar Site’s boundary, then “it should as far as possible compensate for any loss of wetland resources.” While such compensation may be viewed as a form of “no net loss,” the overriding and primary duty is to avoid the need for such compensation in the first place.
91. A “no net loss” policy may have more relevance in the context of a Party’s duty of wise use of the wetlands in its territory. A “no net loss” policy may be part of a National Wetland Policy, for example, and as the annex to Resolution VII.6 observes, a “National Wetland Policy is a key feature envisaged in the implementation of the wise use concept of the Ramsar Convention.” In that regard, Handbook 2 (4th edition, 2010) suggests that a Contracting Party may “design no net loss or net gain projects focusing on wetland functions and values (including wetland area where administratively required) within national, regional or municipal wetland programmes.”
92. Moreover, Handbook 3 (4th edition), in the context of assessing the effectiveness of existing wetland-related legal and institutional measures in promoting wetland conservation and wise use, advises Contracting Parties to consider “where development involves wetland loss or degradation . . . whether there is a legal requirement to make monetary or other compensation, consistent with the polluter pays principle.” A properly structured “no net loss” policy may be one aspect of a Contracting Party’s implementation of the wise use obligation.
93. Although a “no net loss” approach is incorporated into several Contracting Parties’ wetland laws and policies, there are few studies evaluating the effectiveness of such policies. The US studies that have been undertaken suggest that the goal of no net loss is not being met, especially with respect to wetland functions (ecosystem services), due to failure of compensation projects.
94. For example, for the USA the US National Research Council (2001)⁶ found that “the goal of no net loss of wetlands is not being met for wetland functions by the compensation program, despite progress in the last 20 years.” The National Research Council therefore strongly recommended that impacts to wetlands that are difficult or impossible to restore, such as fens or bogs, be avoided. More recently, the US Fish and Wildlife Service’s Wetlands Status and Trends⁷ reported a net gain in national wetland area from 1998 to 2004, but emphasized that there is no data to support a conclusion that a net gain in functions exists. Stedman and Dahl (2008)⁸ later pointed out that certain regions of the

⁶ National Research Council 2001. *Compensating for Wetland Losses Under the Clean Water Act*. National Academy Press, Washington DC. 322 pages.

⁷ Dahl, T. E. 2006. *Status and Trends of Wetlands in the Conterminous United States 1998 to 2004*. US Fish & Wildlife Service, Washington DC.

⁸ Stedman, S. & Dahl, T.E. 2008. *Status and Trends of Wetlands in the Coastal Watersheds of the Eastern United States 1998 to 2004*. US Fish & Wildlife Service, Washington DC.

country and certain types of wetlands suffered losses from 1998 to 2004; for example, wetland losses in the southeastern US averaged more than 23,800 hectares annually during that period. There do not appear to be any comprehensive evaluations of the effectiveness of “no net loss policies” of other Contracting Parties.

95. In summary, first, the Ramsar Convention encourages a “no loss” approach. A “no net loss” policy may be one means of implementing a Contracting Party’s wise use obligation. Although the goal of a “no net loss” policy is to offset wetland impacts, there are no studies to suggest whether Contracting Parties with such a policy have achieved “no net loss” with respect to wetland functions rather than wetland area. Accordingly, Contracting Parties with “no net loss” policies should continue or commence monitoring the effectiveness of such an approach. In light of the lack of these data, a “no net loss” policy should not be implemented in a manner that undermines the primary imperative to avoid impacts to natural wetlands.

Wetland banking and other biodiversity offset schemes

96. *Wetland banking* (often referred to as *wetland mitigation banking*) is a tool for providing wetland compensation to offset unavoidable impacts that remain after mitigation measures. It is most well developed in the USA, where it is viewed as an incentive-based approach to wetland protection. In its simplest form, a site owner generates compensation credits through the restoration, enhancement, creation, and/or preservation of wetlands. The amount of credits generated is based on the ecological improvements at the site. Credits are then sold to developers to offset adverse wetland impacts to the same type of habitat elsewhere.
97. It is expected that regulatory agencies will oversee each step of the process:
- i) approval of the establishment of a wetland bank, which determines baseline conditions at the site and potential credit generation if performance standards are met;
 - ii) approval of the release of credits – thereby making them eligible to be sold or transferred – once the performance standards have been met; and
 - iii) approval of the use of credits in specific permit actions to ensure that a project’s impacts are adequately offset by the environmental gains that the credits represent.
98. A main feature of wetland banking in the USA is that the legal responsibility for compensation shifts from the permittee (the project developer or proponent) to the wetland banker. Accordingly, while the wetland permittee is ostensibly buying wetland credits, it is also purchasing a release of liability. Once the transaction occurs – with government approval – the wetland banker becomes responsible for ensuring that the compensation site is properly maintained and monitored for the long term.
99. *Biodiversity offset schemes*, also referred to as *offset programmes*, are conceptually similar to wetland banking but can be broader than wetland habitat or wetland-dependent species. Biodiversity credits are generated by restoring, enhancing, or preserving elsewhere the same type of impacted ecosystem. Before considering offsets, developers should undertake avoidance and mitigation measures. Examples of active biodiversity offset programmes can be found in Australia and the USA. Recently, the EU approved a strategy for reducing biodiversity loss by 2020 which would serve as the basis for developing a species-banking

program. The strategy, which is pending approval by the European Council, also endorses the concept of no net loss of biodiversity.

100. As with any form of compensation, these approaches should not be used in such a manner as to circumvent the avoidance of impacts to wetlands, and the preference to compensate for wetland loss with wetlands of a similar type and in the same local water catchment, addressing both the areal extent and functional performance.
101. For further information on wetland mitigation banking and biodiversity offset schemes see: IUCN 2004⁹; Ecosystem Market Place 2010¹⁰; Zwick 2011¹¹ and Gardner 2011¹².

Box 5. Mitigation banking. Case study: Kennecott Utah Copper: the Inland Sea Shore Bird Reserve

Kennecott Utah Copper, a subsidiary of Rio Tinto Plc., operates the largest copper mine in North America. In 1994, the company sought to expand its storage capacity for tailings. After considering a number of sites for the storage, the company selected an area adjacent to its main tailings impoundment along the south shore of the Great Salt Lake, which is part of the Western Hemispheric Shorebird Reserve Network and provides habitat to migratory birds and waterfowl. U.S. law required the company to follow an “avoid, minimise (mitigate), and compensate” sequence.

At least 12 alternative sites were examined, and wetland impacts could not be entirely avoided because of the scale of the project. The selected site resulted in direct impacts to 427 hectares of wetlands; the area had already been highly modified, however, and included degraded salt pans and industrial lands. To offset unavoidable impacts, the company purchased a 1,011-hectare site less than one kilometre away from the project. In selecting the site, the company considered its acreage and hydrology, as well as its ecologic and geographic similarity to the impacted habitats.

A Technical Advisory Committee, including representatives from federal and state agencies and NGOs, helped to develop a compensation plan. Because of the project’s proximity to the Great Salt Lake, the focus was upon offsets for impacts to habitat for nesting and migratory shorebirds and waterfowl. Compensation included removal of trash and weeds, construction of fences to keep out cattle and trespassers, and construction of ponds and water conveyance canals for the restoration and creation of shorebird habitat. Monitoring results indicate that the ecologic values of the site, now known as the Inland Sea Shorebird Reserve, have significantly increased. For example, it is reported that over 100 bird species have been sighted at the reserve, and an estimated 120,000 shorebirds and waterfowl use the site annually.

In 1997, the site was expanded to include another ca. 350 hectares, including four additional ponds. The company plans to use this area primarily as compensation to offset impacts associated with its future activities. The entire area is protected by a conservation easement. A

⁹ IUCN. 2004. *Biodiversity Offsets: Views, Experience, and the Business Case*. IUCN, Gland, Switzerland.

¹⁰ Ecosystem Market Place. 2010. *Estate of Biodiversity Markets: Offset and Compensation Programs Worldwide*.

¹¹ Zwick, S. 2011. *Proposed EU Biodiversity Strategy Supports Species Banking*, Ecosystem Market Place (May 4, 2011), www.ecosystemmarketplace.com/pages/dynamic/article.page.php?page_id=8284§ion=news_articles&eod=1.

¹² Gardner, R. C. 2011. *Lawyers, Swamps, & Money: U.S. Wetland Law, Policy, and Politics*. Island Press.

suitable endowment will be negotiated between the company, the federal regulatory agency, and a third party if there is a change in ownership.

The Inland Sea Shorebird Reserve has participated in many research activities around Great Salt Lake concerning shorebird use and fecundity (Cavitt 2006) and impounded wetlands assessment (UDEQ 2009), and it has been used as a control site for other compensatory offsets. In 2004, the Inland Sea Shorebird Reserve, as part of the larger Gilbert Bay ecological unit, was recognized as an Important Bird Area.

Sources:

Kerry Ten Kate, Josh Bishop, & Ricardo Bayon, IUCN, Biodiversity Offsets: Views, Experience, and the Business Case (2004), *available at* http://water.epa.gov/lawsregs/guidance/wetlands/upload/2004_11_5_wetlands_Biodiversity_Offsets_Report.pdf.

Kerry Ten Kate, Josh Bishop, & Ricardo Bayon, TEEB, The Kennecott Inland Sea Shorebird Reserve (2010), *available at* www.eea.europa.eu/atlas/teeb/the-kennecott-inland-sea-shorebird.

USACE Permit Agreement (Permit No. 199450301) (1996), *available at* https://rsgis.crrel.usace.army.mil/ribits/f?p=107:25:4045198597746697::NO::P25_REPORT_ID,P3_LOCATI ON:235,BANK.

Wetland Mitigation Banking Agreement: www.eli.org/pdf/wmb/UT.WMB.Inland_Sea_Shorebird_Reserve_Bank.pdf.

Personal communication with Ann Neville.

Development of an assessment framework for impounded wetlands of Great Salt Lake: www.deq.utah.gov/Issues/gslwetlands/docs/FinalReport122209.pdf

Great Salt Lake Snowy Plover Survey: <http://departments.weber.edu/avianecologylab/SNPL%20Survey.htm>

Great Salt Lake Waterbird Survey 1997-2001: <http://wildlife.utah.gov/gsl/waterbirdsreport.htm>

Cavitt, J.F. 2006. Productivity and foraging ecology of two co-existing shorebird species breeding at Great Salt Lake, UT: 2005 – 2006 Report. Avian Ecology Laboratory Technical Report. AEL 06-03. Weber State University, Ogden UT. 38pp. : <http://departments.weber.edu/avianecologylab/PublicationFiles/ProductivityForagingReport06-03.pdf>

4.7 Monitoring and verification of outcomes of mitigation, compensation and restoration activities

102. Section 4.3 above provides guidance on the assessment and monitoring of risks, impacts and change in ecological character in wetlands. A separate set of monitoring considerations arise in relation to verification of the outcomes of mitigation, compensation and restoration activities. It is crucial to build in some provision for this in relation to any such activities, wherever they may occur in the avoid-mitigate-compensate sequence.

103. Ramsar guidance on management planning for Ramsar Sites and other wetlands (Resolution VIII.16, Ramsar Handbook 18, 4th ed.) provides some information on monitoring the achievement of project standards, as follows:

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. 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.

104. The essence of the principle here is that there should be an adaptive feedback loop, not just a series of linear steps. Ramsar guidance on Environmental Impact Assessment (Resolution X.17, Handbook 16, 4th ed.) addresses similar issues, as follows:
- i) Monitoring and auditing are used to compare the actual outcomes after project implementation has started with those anticipated before implementation. [This] also serves to verify that the proponent is compliant with [any] environmental management plan (EMP).
 - ii) Management plans, programmes and systems, including clear management targets, responsibilities and appropriate monitoring should be established to ensure that mitigation is effectively implemented, unforeseen negative effects or trends are detected and addressed, and expected benefits (or positive developments) are achieved as the project proceeds. Sound baseline information and/or pre-implementation monitoring is essential to provide a reliable benchmark against which changes caused by the project can be measured.
 - iii) Provision should be made for emergency response measures and/or contingency plans where unforeseen events or accidents could threaten [wetland ecological character]. The EMP should define responsibilities, budgets and any necessary training for monitoring and impact management, and describe how results will be reported and to whom.
 - iv) Provision [should be] made for regular auditing in order to verify the proponent's compliance with the EMP, and to assess the need for adaptation of the EMP [...]. An environmental audit is an independent examination and assessment of a project's (past) performance. It is part of the evaluation of the environmental management plan and contributes to the enforcement of EIA approval decisions. The results of monitoring provide information for periodic review and alteration of environmental management plans, and for optimising environmental protection through good, adaptive management at all stages of the project.

4.8 Reporting obligations

105. The reporting obligations required under each step of this Framework should follow the existing guidance already adopted by Contracting Parties. The flow charts provided in the annex of Resolution X.16 describe the appropriate reporting obligations applicable to this Framework for Ramsar Sites and other wetlands (see also Handbook 19, 4th ed.).