



Working towards the ecologically sustainable conservation, management and wise use of wetlands in NSW

Compensatory Wetlands

A discussion paper
under the
NSW Wetlands
Management Policy



November 2002





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Prepared for the NSW Government by the Department of Land and Water Conservation in consultation and the NSW State Wetland Advisory Committee (SWAC). This committee consists of people from State Government Departments, local government, environment groups, industry, community, science and education areas.

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Much of the information in this discussion paper has been drawn from a *Draft Background Paper on Compensatory Wetlands* by Sainty & Associates (2000), specifically prepared for the State Wetland Advisory Committee to explore the use of compensatory wetlands.



Kerryn Richardson

Pelicans at the Macquarie Marshes



Executive Summary

The *NSW Wetlands Management Policy* is a whole-of-government policy released in 1996 to encourage the community and government to work in partnership towards the ecologically sustainable conservation, management and use of wetlands in New South Wales.

The NSW State Wetland Advisory Committee (SWAC) was set up to encourage and assist with the implementation of the policy. SWAC was appointed by the Minister for Land and Water Conservation and comprises representatives from government agencies, non-government organisations, the community, research areas and industry.

The policy is based on nine wetland management principles. Principle six of the policy states that natural wetlands should not be destroyed or degraded, but when social or economic imperatives require it, the rehabilitation or construction of a wetland is necessary.

When wetland loss occurs or is projected to occur there is no guidance for compensation in NSW. The compensation that does take place is *ad hoc*, not transparent, and mostly inadequate in that there is no allowance for the long-term management of, and responsibility for the wetlands. Compensation appears to be a fact of life under Ecologically Sustainable Management and it is important that sustainable guidelines are developed.

To address this inadequacy, SWAC has prepared this discussion paper to outline the major principles, options and issues associated with compensatory wetlands. It is hoped that one of the outcomes of this document is the development of guidelines on the compensation principle under the *NSW Wetlands Management Policy*.



Introduction

1.1 The NSW Wetlands Management Policy 1996

The *NSW Wetlands Management Policy 1996* is a whole-of-government policy for the ecologically sustainable conservation, management and use of wetlands in NSW for the benefit of present and future generations.

The policy specifies nine wetland management principles, listed below.

1. Water regimes needed to maintain or restore the physical, chemical and biological processes of wetlands will have formal recognition in water allocation and management plans.
2. Land use and management practices that maintain or rehabilitate wetland habitats and processes will be encouraged.
3. New developments will require allowance for suitable water distribution to and from wetlands.
4. Water entering natural wetlands will be of sufficient quality so as not to degrade the wetlands.
5. The construction of purpose built wetlands on the site of viable natural ones will be discouraged.
6. Natural wetlands should not be destroyed, but when social or economic imperatives require it, compensation through the rehabilitation or construction of a wetland will be required.
7. Degraded wetlands and their habitats and processes will be actively rehabilitated as far as is practical.
8. Wetlands of regional or national significance will be conserved.
9. The adoption of a stewardship ethos and cooperative action between land and water owners and managers, government authorities, non-government agencies and the general community is necessary for effective wetland management.

Central to the issue of compensatory wetlands is principle six:

- natural wetlands should not be destroyed, but when social or economic imperatives require it, compensation through the rehabilitation or construction of a wetland will be required.

Complimentary to this is principle five:

- the construction of purpose-built wetlands on the site of viable natural ones will be discouraged.

1.2 Implementation of the New South Wales Wetlands Management Policy

When the *NSW Wetlands Management Policy* was released in 1996, the Minister for Land and Water Conservation simultaneously appointed a whole-of-government committee to encourage and assist with the implementation of the policy. This committee, the NSW State Wetland Advisory Committee (SWAC), comprises representatives from government departments, non-government organisations, industry, research areas and the community.

SWAC has identified a need to provide some form of guidance for the use of compensatory wetlands. To this end, this paper has been developed to outline the major principles, issues, and options associated with compensatory wetlands. Much of the information in this paper has been drawn from a *Draft Background Paper on Compensatory Wetlands* by Sainty & Associates (2000), specifically developed to assist SWAC explore the options for the use of compensatory wetlands.

1.3 Wetlands Definition

The *NSW Wetlands Management Policy 1996* defines wetlands as areas that are wet for a long enough period such that the plants and animals living in them are adapted to, and often dependent on, living in wet conditions for at least part of their life cycle. Wetlands are land that is:

- inundated with water on a temporary or permanent basis;
- inundated with water that is usually slow moving or stationary;
- inundated with water that is shallow; and
- inundated with water that may be fresh, brackish or saline.

The inundation determines the type and productivity of the soils and the plant and animal communities. The policy applies to all natural wetlands. It does not apply to existing wetlands that have been constructed to satisfy other purposes (eg sewage treatment, rice production, general irrigation, or stormwater retention) except where that purpose is as a wetland rehabilitated or constructed as compensation for the degradation or destruction of a natural wetland.

1.4 Wetland Values

In NSW, there are approximately 4.5 million hectares of wetlands, which equates to approximately six per cent of the State's area. Wetlands are ecologically, economically and socially important, providing a number of ecosystem functions and services, including:

- biodiversity conservation;
- habitat provision;
- improvement and maintenance of water quality;
- biological productivity and nutrient cycling;
- flood attenuation;
- groundwater recharge;
- shoreline stabilisation & storm protection;
- climate change mitigation;
- scientific research;
- education;
- recreation;
- cultural heritage and spiritual values, and
- wetland products.



Principles of Wetland Compensation

In determining when wetland compensation is necessary it is important to consider the following.

- Principle six of the *NSW Wetlands Management Policy* requires that compensation should only take place where social or economic imperatives give no other alternative. This means that compensation is a mechanism to use as a last resort and as such compensatory wetlands should be few in number, by their very nature.
- Knowledge, value judgements and economic and social imperatives will constantly change. Social and economic imperatives are discussed further in Section 3.
- If the conservation value of a wetland is very high, the wetland should not be subject to development at all. Descriptors for determining high conservation value wetlands are provided in Section 10.
- The order of process is to **avoid** wetland destruction altogether, and, as a last resort **ameliorate** and **compensate**.
- In very specific instances, compensatory wetlands may offer valid restitution where destruction of a natural wetland is unavoidable.
- In determining the best course of compensatory action, it must be accepted that wetlands are intrinsically dynamic in nature.



3 Acceptable Loss

Social and economic imperatives are the parameters for defining what is acceptable loss of natural wetlands. However, defining what constitutes social and economic imperatives, and what the *limits* of acceptable loss are, often raises more questions than answers.

Social and economic imperatives are determined by the government of the day in its decision-making process, and depend on many factors, including political will. Decisions to proceed with development in wetlands can be made after determining that:

- the development is imperative for reasons of over-riding public interest;
- there are no other alternatives (eg the developer cannot go around the wetland), and
- all possible compensatory measures have been considered and have or will apply.

Social and economic imperatives must be defined before the value of a natural wetland or the value of any compensatory action is defined. Then, social and economic imperatives should only be operative when the environmental costs of not proceeding with the development outweigh the costs arising from the destruction of the wetland. Some of the more obvious instances that invoke the concepts of social and economic imperatives include:

- service corridors – road, rail, power, gas, water, communication;
- military defence installations;
- airport and harbour facilities;
- power stations;
- major water supply and flood storage infrastructure, and
- essential enhancement of other existing macroinfrastructure.

In using social and economic imperatives to set the standards of development and compensatory action in wetlands, there must also be a limit applied. That is, there are some wetlands that are highly valuable and impossible to replace and cannot, under any circumstances, be subject to development. This means that a no net loss policy really refers to no loss of significant wetlands and no net loss of other wetlands in terms of both area and function. All wetlands are important but there are some that are of extremely high value (eg Ramsar wetlands) or rare type (eg peat bogs and acid fens) that cannot be recreated.

3.1 Developmental Impacts Requiring Compensation

Any development that results in clearing, filling, dredging or draining of wetlands, or requires the construction of a structure, will impact on the wetland and should require compensation. Likewise, any developmental action in a catchment that will impact on a Ramsar wetland, CAMBA or JAMBA species, or threatened wetland dependent species, population or community should be compensated for.

Requirements for compensatory wetlands already exist in NSW under the Environmental Planning and Assessment Act 1979 (SEPP14 wetlands) and under the Fisheries Management Act 1994. Details on these processes are provided in Section 8. Ramsar wetlands and associated threatened and migratory species are now also protected under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999.

In NSW, most development pressures on wetlands arise through urban development, agricultural development and water resources development. The resulting impacts include:

- loss of the wetland values described above;
- sedimentation;
- loss of aesthetic values;
- loss of species and shifts in species dominance;
- changed hydrologic regimes, e.g. permanent inundation;
- increase in the occurrence of pest animal and plant species;
- acid sulfate soils;
- salinity;
- nutrient enrichment, and
- pollution.

4

Baseline Assessment



In terms of implementing compensatory wetlands, two things must be considered:

- the approach that will be taken to maintain the compensatory habitat over the long term, and
- the probability of success.

Underlying this, is the assumption that we have information on all wetland functions and values to achieve successful compensation. Therefore, before the decision to destroy or modify a wetland is made, a baseline assessment must take place of the wetland area to be developed and of the potential site that will provide compensation. This will determine the area, values, services and functions that will be lost and will provide planners and decision-makers with benchmark information against which changes can be measured. It is also necessary to consider the role of the wetland in the catchment and its influence on downstream habitats.

The purpose of wetland assessment must be carefully considered. If it is limited to providing a catalogue of basic characteristics, the principal attributes can be used to derive a simple and effective set of groupings. When the purpose is to establish comparable commercial and conservation valuation for individual wetlands or potential wetlands, further attributes, which have both subjective and objective elements, must be incorporated in the process.

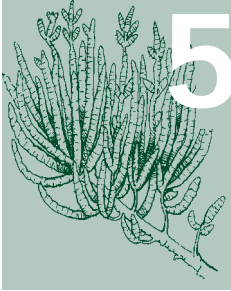
Minimum information must include:

- type of wetland (including perennial/ephemeral, whether unique, rare, common etc.);
- size (absolute, catchment/water body ratio);
- proximity (distance from other wetlands, both similar and dissimilar);
- conservation/habitat value;
- land ownership (Crown land, freehold, leasehold, reservation for purpose);
- land value (market value, productivity, water rights);
- land zoning (permitted and prohibited activities), and
- catchment condition (existing condition, potential negative and/or positive change).

It is, of course, necessary to obtain consent from the owner of the existing wetland and the site(s) for the proposed compensatory wetlands.

It is also necessary at the outset to determine the tenure and management of compensatory wetlands. This is because there needs to be a commitment to the long-term management, maintenance, conservation and protection of wetlands in the context of the entire catchment.

Scientifically rigorous information on how wetland systems operate and can be rehabilitated or restored is essential for the sustainability of the wetland resource base and in order to achieve no net loss.



5 Options For Ecologically Sustainable Wetland Compensation

5.1 No Net Loss

What Is It?

No net loss implies that from now on, there will be no overall loss of wetlands. Therefore, any loss of wetlands, as a result of anthropogenic activities, must be offset by wetland gains. For the purposes of this paper, no net loss refers to wetland area, values, services and functions. To replace some of the values, services and functions it is usually necessary to replace greater areas of wetlands than those being destroyed/modified.

While no net loss is also a principle of wetland conservation, it is discussed here as an option. The other options are net loss or net gain. No net loss of wetlands is an objective under the *NSW Wetlands Management Policy* and is consistent with the principles of Ecologically Sustainable Development. No net loss is also applied to the conservation of native vegetation in NSW.

It is important to note that there are some issues associated with the interpretation of no net loss, because in some instances the definition applies to wetland area alone. Where this is the only criterion, the values, functions and services provided by wetlands are not necessarily compensated for. This means that low-function compensatory wetlands can replace highly functional natural wetlands. This is contrary to the overall goal of protection and sustainability of wetlands. It should also be noted that where attempts have been made to compensate for lost functions and values, few studies have been undertaken to assess whether this goal has been accomplished.

Aspects of No Net Loss

- The objectives of no net loss are:
 - no loss of high conservation value wetlands;
 - no further overall loss of wetlands except for reasons of overriding public interest;
 - no further wetland degradation;
 - wise use of wetlands, and
 - improvement and rehabilitation of wetlands.
- Negative environmental impacts resulting from a development or a particular activity can be compensated for with positive environmental outcomes, either as a direct result of that development or activity or by actions taken to provide alternative environmental benefits.
- The key to achieving acceptance of the no net loss concept lies in changing the mindsets of stakeholders through closer involvement, partnerships, monitoring and promotion of schemes that recognise and reward positive environmental outcomes.

- It is crucial to ensure that the process does not weaken the resolve to retain natural wetlands, except where social and economic imperatives require it.
- While the no net loss principle is acceptable in theory, experience has shown that compensatory actions, such as constructed wetlands, have not always successfully replaced what has been destroyed. However, the fact that full replacement has not always been successful does not mean that compensation should be discouraged outright.

Feasibility of Implementation

The practical needs of implementing no net loss include assessing wetland area, values, functions and services and ensuring long term management and monitoring of the compensatory area to ensure that it becomes self-sustaining. This may mean that implementation involves placing some kind of stewardship over the compensatory habitat that would be similar to the management given to other natural resource assets, such as national parks and reserves.

No net loss does not necessarily have to be defined by individual cases. It can be defined instead in terms of the overall national / State resource base in order to reach an equilibrium between losses and gains in the short and long term. This takes into account the fact that all losses cannot be stopped or compensated. It also addresses the fact that any social and economic benefits of development need to be met with conservation outcomes. In addressing no net loss at a regional scale, a number of viable alternatives could be available.

The issue associated with no net loss is that replacing lost values and functions is inherently difficult and the replacement will never be exactly the same as what has been lost. Ecological processes of balance, equilibrium, homogeneity and determinism cannot be second-guessed. There are reasons for this, such as the lack of habitat requirements for a species, a lack of pollinators, recruitment conditions may be lacking, an exotic species may have invaded a compensatory site, or the design and location of the compensatory habitat may be wrong (Committee on Mitigating Wetland Losses, *et al.*, 2001).

5.2 Compensation Ratio

What Is It?

Compensation ratio is the application of a multiple compensation factor in regard to the original wetland lost. This option for compensation is really a corollary of the no net loss principle, as studies and experience indicate that there is a low probability of successfully replacing wetlands of high conservation value. Experience has also taught us that some new wetlands will fail. To try and allow for these problems, the common approach has been to require some multiple of the original area to be established/rehabilitated. In some countries where this is applied, wetlands of the highest conservation value are simply banned from modification and alternatives must be found.

Aspects of Compensation Ratio

- Like-for-like replacement, such as saltmarsh for saltmarsh, is not always completely successful and therefore compensation ratios can be applied.
- A multiple compensation factor is applied to the area of original wetland destroyed. There is no upper limit to the ratio that can be used. Ratios can range between 2:1 and 100:1. If a 2:1 replacement ratio is applied, it is assumed that even with a 50% failure rate of the compensatory wetland to replicate the lost area, that no net loss will be incurred. If the failure rate is higher then a higher replacement ratio can be applied.
- The ratio factor needs to be applied on a case by case basis.
- A 'flat rate' multiple compensation factor is unsustainable if applied universally, on the grounds of equitable treatment and of practicality. It would be unreasonable to expect each development to create the same degree of loss of worth on a per hectare basis and equally unreasonable to assume that the worth of new compensatory wetland will be the same on a per hectare basis.
- Categorisation of high rates of compensation for high conservation values and lower compensation rates for low conservation values or degraded wetlands is an oversimplification. Integral to this point is the concept that if a wetland is of high value it should not be developed at all.
- In most instances, limitations should be placed on the amount of wetland to be destroyed to minimise the impact of loss. If the impact of the development outweighs the value of the remaining wetland area then a compensation ratio may also be applied.
- In applying compensation ratios, cumulative impacts need to be considered in the context of ongoing losses from one wetland or losses from several wetlands in one area.
- To determine the compensation ratio to be applied, it is necessary to identify the environmental, cultural, recreational and landscape values to be lost or degraded on a case-by-case basis.

Feasibility of Implementation

If compensatory wetlands are to be implemented, then a multiple compensation ratio must apply. NSW Fisheries and Planning NSW currently use ratios in implementing compensatory wetlands under the Fisheries Management Act and SEPP14, respectively.

Because original habitat function and value can not be replaced in exact terms, the greater the risk that exists for not being able to replace a functional wetland, the greater the multiple compensation ratio that needs to be applied.

5.3 Wetland Banking/Investment/Tradeable Rights

What Is It?

Wetland banking is the rehabilitation, restoration or creation of wetland habitat to compensate for anticipated development losses of wetlands.

Wetland banking offers the potential for the creation of a resource base of many kinds of wetlands in many geographic locations, particularly if existing degraded wetlands can be rehabilitated and held in reserve, as it were, against future losses; it allows for the planning of environmental needs such that a surplus of the resource can be maintained and a future supply guaranteed in terms of cost and quantity (but this does not always translate to quality). The system can be established in a variety of ways but essentially it allows the placement of funds into some kind of trust that uses the money to build and/or maintain wetlands in strategic localities.

Aspects of Wetland Banking/Investment/Tradeable Rights

- This concept attempts to address the time lag factor associated with environmental destruction. The destruction of a wetland and creation of a new development is almost instantaneous. In contrast, the creation of a new wetland, or the rehabilitation of another wetland area, may take at least a decade before the system is fully functional and stable. The costs and processes along the way are only broadly identifiable. Unanticipated issues, including cumulative impacts elsewhere in the catchment, may extend timeframes and costs beyond original estimates.
- Different forms of incentives can be used for existing owners and investors, which might include ethical values recognition, direct financial subsidies (grants, rate support), indirect financial assistance (tax relief), gratis technical assistance and a market registration scheme. As far as conservation and management agreements are concerned, they need to be attached to property titles so that they exist in perpetuity, as they do with Ramsar agreements.
- A market registration scheme could operate either on strictly commercial terms or, more probably, under an authority directly responsible to government, to bring together buyers and sellers to achieve tradeable rights.
- Tradeable rights, where some buyers might be intermediary parties rather than end users, could allow either the direct acquisition of tenure against a foreseeable future need, or the accumulation of wetland 'credits' that might be redeemable at a future date without the acquisition of title. To avoid a situation where external factors (such as the necessary acquisition of a particular wetland or a portion of it) might introduce speculative pricing practices, any registration scheme would need to be underpinned by commercial regulation that provides

for compulsory acquisition of tenure (or the right to manage the wetland in accordance with any conditions set by an approving authority) at fair and just cost terms. Tradeable rights should only be encouraged on the basis that both large wetland areas and networks of wetlands are maintained.

Feasibility of Implementation

Mitigation banking requires an agency to have overall responsibility for establishing and operating the bank with up front financing, guaranteed return on investment for the developer (possibly some years after the bank is established) and a legal requirement that mitigative action is carried out. Regulation of developments must also continue. Due to the time lag with environmental outcomes, with either degradation or rehabilitation, either the bank would have to be established some years before it could be used for compensatory action or the use of a bank would not become evident for some years after.

At the present time, this option for compensation is not very viable as illustrated overseas where it has, on the whole, been very problematic. The main obstacle to implementing wetland banking overseas has been the ability to sustain optimal dynamic wetland functioning over the long term.

In Australia, existing legislation and policy does not cater for wetland banking - it could only be successful if there were supportive planning, regulatory and administrative mechanisms. A further problem in New South Wales, especially west of the Divide, is the high demand for a limited resource and the potentially low water security allowed for such an enterprise. The use of wetland banking also requires a superior knowledge of wetland functioning and ecological processes in order to sustain biological diversity. This kind of knowledge is currently lacking.

On the basis of what we know and what we have set-up in Australia in the way of financial and regulatory frameworks, we cannot recommend wetland banking as a viable option, however, it should not be discounted as an option in the future.

5.4 Catchment Protection

What Is It?

- Catchment protection is the purchase or management control of a catchment or sub-catchment with the aim of protecting water quality and supply to downstream wetlands or other users.

Aspects of Catchment Protection

- In their natural state, wetlands are found at, or very close to, natural hydraulic gradient point breaks in a catchment, or in the case of closed systems, at the lowest point of the system. This means that the health of wetlands is heavily influenced by what is occurring upstream.

- Wetland functions service the entire catchment, e.g., water quality maintenance, nursery, breeding and recruitment areas, climate change mitigation, flood protection. These functions assist in maintaining the overall health of the catchment.
- Insidious wetland loss often occurs through incremental impacts at the catchment scale, such as nutrient enrichment (e.g., from urban or agricultural development), sediment deposition (e.g., lack of erosion control or inappropriate source control) and altered hydrology (e.g., discharge from a sewage plant, or development that increases hard surfaces and subsequently changes run-off characteristics). These impacts can be ameliorated at specific wetland sites through ensuring the sustainable management at the catchment level, i.e., managing problems at the source.
- You cannot have good wetland management without considering what is happening in other parts of the catchment. This is an offset option in itself because catchments and sub-catchments can be maintained at the expense of development in others.

Feasibility of Implementation

This option will only be feasible in very few situations, where the catchment / sub-catchment is not large, and where there is a system in place for perpetual management.

The obstacle to this kind of compensatory action is that it almost always requires the purchase or control of the entire catchment. It would be imperative in this situation to prevent degradation through incremental change.

5.5 Monetary Compensation

What Is It?

This is the concept of requiring monetary compensation for destroying wetlands and making this cost prohibitively high, so that demand is confined to undertakings that concur with social and economic imperatives.

Aspects of Monetary Compensation

- This method requires that the values, services and functions of wetlands be quantified. Wetlands have not traditionally been valued at their true worth. With the introduction of Ecologically Sustainable Development, more ecosystems are being given an economic value. In the case of wetlands, this is very high given the functions and services they provide. A recent global assessment of the worth of natural ecosystems estimated their value at US \$33 trillion. Of this, wetland ecosystems were estimated to be worth \$ 14.9 trillion, or 45% of the total (Ramsar Bureau, 2001).
- This form of compensation is commonly rejected on the grounds that monetary compensation cannot replace the environmental loss. There is also a strong possibility that wetland destruction will be “bought” regardless of the true merit of a development.

- It must be ensured under this method that the beneficiary of the compensation is clearly identified and justified.
- Bonds or perpetual trust funds may be established rather than focusing on a single, high value, lump sum payment. This method of monetary compensation has the potential to provide for the ongoing management of a wetland area.
- This method of compensation may also include actions whereby positive environmental outcomes result from 1) a direct consequence of that development, or 2) actions taken by an industry or developmental activity to provide alternative environmental benefits.

Feasibility of Implementation

This is quite a feasible option and is already used in some areas of NSW, at the State and local government levels. However, any funds that come out of such a system must go back into the long-term management of the wetland, and not into consolidated revenue.



6 Other Issues for Consideration

6.1 Contingent Liability

The decision to construct a compensatory wetland or rehabilitate an alternative degraded wetland may create a contingent liability on several parties if the compensatory action fails or is only partially effective in replacing lost values, functions and services.

It may also, for reasons not possible to predict at the time, create future hazards such as flooding, groundwater deterioration and loss of visual amenity. Consideration must be given to determining the liability for such hazards and the remedies available. To a certain extent, some future hazards can be reasonably foreseen and provided for in a management plan encompassing ongoing monitoring and maintenance where the responsible party is clearly defined. However, there is the potential for an 'orphan' situation to develop, as has occurred with some terminated mining operations. In these instances, all obligations required under law have been complied with at the time of termination, leaving the government of a later day to assume responsibility for a derelict site. These factors will be crucial to the implementation of any compensatory option.

6.2 Location of Compensatory Wetlands: Catchment Considerations

Wetland functions must be understood at the catchment level to secure other catchment objectives, such as water quality maintenance and the protection and provision of habitat for migratory species.

When implementing compensatory wetlands, there is a strong preference for the compensatory action to take place as near to the development site as possible. However, locating a compensatory wetland near to a development site does not automatically guarantee that the lost wetland functions will be replaced.

To address this, it should be made a preference to site compensatory action near the lost wetland but it should not be automatic. Rather, an assessment should be made of the catchment level needs, most especially the hydrology, and the ability of any compensatory wetland to provide optimal functioning and hydrological equivalence over the long term. This means that the wetland and the catchment should reciprocate functioning so that the wetland is eventually self-sustaining. However this does not mean that the most convenient wetland type should be rehabilitated / created rather than the most appropriate (Committee on Mitigating Wetland Losses, *et al.*, 2001).

The positioning of a compensatory site in the catchment where hydrologic equivalence can be established is crucial to long term sustainability and biodiversity conservation. Wetlands are water-based ecosystems and any compensatory action will fail if the right water regime does not exist.

Even if all of the right locations can be provided, there are some wetland types that are difficult or impossible to replace, such as peat beds, hanging swamps and acid fens. This is because these wetland ecosystems require a specific combination of plant types, soil characteristics and water supply that cannot be created from scratch. Other types of wetlands, such as riparian wetlands, may also be very difficult to replace because of their value for stream water quality and overall stream/catchment health, which cannot be duplicated anywhere else in the landscape (Committee on Mitigating Wetland Losses, *et al.*, 2001).

While regional wetland requirements must be addressed, it should be noted that their linkages and connectivity are not well understood. Compensatory wetlands have a better chance of success where there are aquatic linkages and corridors connecting wetlands. This allows processes such as dispersal and recruitment to occur.

6.3 Ownership and Management of Compensatory Wetlands & Catchments

Responsibility for the long-term ownership and management of compensatory wetlands and catchments must be identified. Land tenures and management styles for wetlands vary across NSW. Natural resource management styles of natural wetlands range from unauthorised destruction, through unawareness to benign neglect and, in relatively few instances, well-funded, integrated and holistic management.

The nature of ownership, however, cannot be taken as a general guide to the management style, particularly when a management matter, such as water supply, may be outside the direct control of the manager.

There is a long-standing history of intervention by government under various schemes (e.g. derelict mines rehabilitation, soil conservation initiatives, flood mitigation works) to remedy environmental problems on both freehold and other land title without resumption of title or creation of special leases, licences or easements.

However, compensatory wetlands appear to be a crossroads where simple restoration, protection and/or rehabilitation are not one-off options. The manager of the compensatory wetland does not need to be the proponent of the development, provided the contingent liability issues, as well as funding for monitoring and maintenance, are adequately addressed.

There are potential difficulties where the proponent of development is to become the owner of a compensatory wetland. The proponent may be unable to acquire the tenure of the land suitable for creation of a compensatory wetland. In other situations, the only other alternative may be for the government to use compulsory acquisition legislation to gain control of the tenure of the land. However, this may not always be possible or acceptable.

If the developer should cease to exist as an entity the transferability of tenure and the obligations with it could become a prolonged and difficult exercise. While some aspects of the above issue could be provided for with positive covenants attached to the title, it is almost impossible to conceive a model that would guarantee that responsibility for long-term management, that would not ultimately revert to government.

Options for consideration include transfer of title to a local authority to manage in perpetuity along with the lodgement of a bond for management. Where the land sought is already held by State or local government, another approach could be to create an easement rather than securing a new and separate title.

Irrespective of the ownership and/or the size of the land needed for the creation of a compensatory wetland, appropriate zoning of the land may require amendment of local and regional planning instruments and State policies. Zoning may also impact on activities and land use in the area surrounding the compensatory wetland and require further modification of planning and policy instruments.



7 Monitoring

Monitoring is the only effective way to document the performance and health of any wetland. High quality monitoring is only achieved with high levels of data acquisition, continuous assessment of that data and speedy application of the interpretation to active and adaptive management. It is important that monitoring is linked to what are perceived the important values for the new or modified wetland. Studies in the USA suggest that there is a high correlation between continued monitoring and perceived success of a constructed wetland. It seems that continued long-term monitoring for the desired outcomes is essential. This is because the period of monitoring must be of sufficient time to allow ecosystem functioning to be established and assessed.

The long-term sustainability of compensatory wetlands, which is what would make taking compensatory action worthwhile, must be achievable through appropriate financial and legal mechanisms. Financial costs of monitoring and regulatory backing are an integral part of the management and maintenance operations and should be recognised at the outset of development.

The question of who should gather the data, how the information should be presented and how other parties might use that information warrants consideration from both the viewpoint of government and the wider community.

Recent studies in the United States have found that most monitoring periods have been too short. It has been indicated that the long-term functioning and sustainability of a compensatory wetland may not be apparent until 10 – 40 years after the project is completed (Ambrose, 2000). A twenty-year period is often recommended as the most practical, and to ensure that functional equivalence is achieved.

Long term monitoring and management is analogous to the management applied to national parks and reserves. To achieve this, wetlands should be monitored until they can be deemed self-sustaining. It is the cost factor associated with long-term monitoring and management that should be the incentive for developers or otherwise designated third parties to establish self-sustaining wetlands to begin with. To achieve this in practical terms, it may also be necessary to have control sites so that monitoring changes is measured not only against the impact of development, but also against natural variations in the environment (Committee on Mitigating Wetland Losses, *et al.*, 2001).

Although the implementation side of compensatory wetlands will vary from case to case, depending on factors such as the size, impact of developments and the value of the targeted wetland area, there now needs to be a more integrated approach to compensatory wetlands to ensure that conservation is not piecemeal and to enable actual implementation of the long-term maintenance of compensatory action. Additionally, the information obtained from monitoring must be available and easily accessible for everyone. This will assist in evaluating the effectiveness of compensatory wetlands.



8 Management Plans

Management plans can be developed as tools to document the intended management aims, objectives and activities for compensatory wetlands. Management plans can also identify monitoring regimes and the indicators that will be used to determine whether management actions have been successful.

Management plans for compensatory wetlands cannot be formula documents that will be uniformly applied to every situation. They are necessarily highly specific to the particular wetland in question and to the function that wetland is expected to perform, and must address those issues closely. Wetlands can impact on areas and issues beyond boundaries and therefore must be recognised at catchment level.

Management plans can be used to:

- define habitats and delineation criteria;
- guide developments to appropriate locations;
- identify priorities for acquisition;
- identify threshold levels that trigger no net loss;
- outline sequence of required mitigation procedures;
- prescribe specific compensation / mitigation options suitable for a range of habitat types, and
- prioritise research, monitoring and maintenance.



9 General Process for Compensatory Action

The process for implementing compensatory wetlands under the approvals process for development should take the order of:

1. **AVOID** - look for alternatives, and where there are no alternatives, justify the location;
2. **AMELIORATE** - lessen the magnitude of impacts of development; &
3. **COMPENSATE** - rehabilitate and as a last resort create wetland habitat as compensation.

9.1 Definition of a Proposed Development – Statement of Purpose

A statement of purpose could be used to demonstrate that there are no feasible alternatives, location and design have been carefully considered and that no significant reduction in value of the wetland will occur as compensatory action takes place. The statement may cover:

- nature and purpose of proposed development;
- rationale for location of development;
- consideration of alternatives;
- impacts of development of wetland;
- compensatory action intended;
- action taken to preserve existing wetland during construction;
- demonstrated commitment to ongoing management (including monitoring) of the compensatory wetland or action.

9.2 Assessment of Existing and Compensatory Wetland Sites

In determining that a development concurs with economic and social imperatives and identifying the need for compensatory action, it is necessary to assess both the existing wetland site and the proposed compensatory wetland site. This will provide the knowledge of what values need to be replaced and provide a benchmark for the level of compensation required.

This information should not be exhaustive but should be adequate enough to be able to make an informed decision regarding the compensation requirements. Assessment should involve a compilation of all existing information as well as site visits by suitably qualified persons.

Assessment can cover aspects such as:

- flora & fauna;
- water regime;
- water source;
- soil types and substrate condition;

- wetland functions;
- wetland health;
- issues – weeds, pest animals, pollution, etc;
- land use zoning;
- relevant policies, planning instruments, legislation, and
- connectivity.

9.3 Compensatory Action

This should be a statement of what compensatory action is intended – rehabilitation, construction, etc., how the compensatory area will be managed and with what tools, e.g. a management plan, monitoring program, etc.



Determining Wetland Value

The value of the wetland, including values and functions, to be developed must be assessed in order to apply appropriate compensation measures. Compensatory wetlands need to be assessed for their replacement value and so that baseline information will be available against which change can be monitored.

Assessment of conservation values is not well understood and has not been consistently and successfully applied anywhere. The development of methods to assess conservation values is in its early stages. It is a topic of extensive research and debate and will evolve in time.

However, there are some general descriptors that can be used in determining the value of wetlands, and, there are several assessment methods readily available that can be drawn on.

10.1 General Descriptors for Assessment of Wetland Conservation Values

All wetlands are important but some will be more difficult to replace than others. Indicators for determining this include the following.

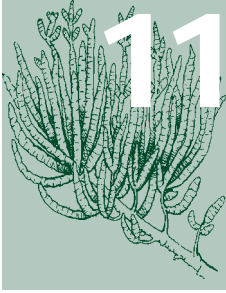
- Level of disturbance – presence of pest plants & animals, water quality, erosion, etc.
- Representativeness.
- Hydrologic/ecological role in the overall functioning of a wetland system/complex.
- Overall catchment health.
- Provision of habitat for fauna at a vulnerable stage in their life cycles.
- Use as drought refuge.
- Occurrence of threatened species/communities.
- Supports 1% or more of the national populations of any plant or animal taxa.
- Designation as a Ramsar wetland.
- Inclusion in the Directory of Important Wetlands in Australia.
- Occurrence of species listed under CAMBA/JAMBA.
- Cultural/historical significance.
- Wetlands that are difficult to replace, such as peat bogs.
- As part of a network of wetlands required for the maintenance of biodiversity.

10.2 References for Methods for Assessing Wetland Conservation Values

AUSRIVAS (**A**ustralian **R**iver **A**ssessment **S**ystem) – a prediction system used to assess the biological health of Australian rivers. Centrally administered by Environment Australia (EA) and the Land and Water Resources Research and Development Corporation (LWRRDC).
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U.S.A. Experience

The United States has implemented compensatory wetlands for over 20 years, providing us with the benefit of their experience. Policy states that the overall goal of environmental management in relation to wetlands, is one of no net loss. Wetlands are protected under legislation given their role in protecting water quality. Most notably, the Clean Water Act prohibits activities in wetlands without a permit. The order of activity under this system is to avoid wetland destruction, ameliorate and then compensate. The Clean Water Act provides for wetland compensation via restoration, creation, enhancement, and in exceptional circumstances, preservation of other wetlands as compensation for impacts to natural wetlands (i.e., wetland banking). Permittees under the Clean Water Act, and not third parties, undertake most compensatory action.

Wetland destruction takes place where a project is not water dependent and where the developer has demonstrated that there are no other alternative sites, that the project is in the public interest and that all means to mitigate impacts on the wetland have been taken.

Recently, a major study has been undertaken in the US to determine the success of the no net loss policy and the use of compensatory wetlands under the Clean Water Act (Committee on Mitigating Wetland Losses, *et al.*, 2001). It has been concluded that:

- mitigation policies have apparently reduced wetland losses but have not achieved no net loss (no available data to confirm);
- the area of the compensatory wetland often does not meet the area impacted;
- few compensatory projects comply with permit conditions;
- very few restored wetlands are able to replace the natural functions that have been destroyed - the magnitude of this shortfall is unknown and cannot be deduced from available data;
- some wetland types are very difficult or impossible to compensate for;
- a catchment level approach would improve implementation;
- compensatory decisions and actions need to be monitored for broader geographic areas and longer time periods;
- support for regulatory decision-making is inadequate, and
- third party compensation approaches (mitigation banks, in-lieu fee programs, cash donation) offer some advantages over permittee responsible mitigation.

The major problem with implementing compensatory wetlands is that while wetland area is being compensated for, wetland functions are not. This is a common scenario around the world. This is important because wetland functions must be catered for at the catchment level to secure other catchment functions, such as water quality maintenance and protection.

US Recommendations

- The wetland area and functions lost and regained over time should be tracked on a national database. Watershed organisations should track, monitor and manage wetlands in public ownership or under easement.
- Avoid destruction of wetlands that are difficult or impossible to replace.
- Compensatory wetlands need to be self-sustaining.
- Improve the science of wetland functioning, rehabilitation and creation needs to be improved.
- Compensatory wetlands should be located and designed to maximise the likelihood of the ongoing ecological contribution to the catchment. This contribution needs to be specified in advance of the compensatory action taking place.
- Compensatory action should be in place concurrent with and preferably before permitted development activities.
- To ensure the replacement of lost wetland functions, there needs to be effective legal and financial assurances for long-term sustainability and monitoring of all compensatory wetlands.
- Initiate inter-agency consensus for setting wetland protection, acquisition, restoration, enhancement and creation on an ecological basis.



NSW Experience

NSW Planning

State Environmental Planning Policy No. 14 – Coastal Wetlands (SEPP14) was introduced in 1985 to protect coastal wetlands in the environmental and economic interests of the State. The policy requires an Environmental Impact Statement, the consent of local council and the concurrence of NSW Planning for development in wetlands. Under the policy development relates to clearing, filling, draining and the construction of levees.

SEPP14 covers approximately 96 502 ha of wetlands between Tweed Heads and Broken Bay and Wollongong and Cape Howe. The Policy does not apply to the Sydney metropolitan area. SEPP14 wetlands are identified on a series of 1:25 000 maps. Amendments are made approximately once a year.

Since 1985, many developments have not proceeded to the stage of development application as a result of the requirements of the policy. In such instances, there has been a tendency for developers to look for alternative sites to wetlands in the final development proposal. Development applications are usually refused where large-scale irrevocable damage to a wetland would occur. There are also many instances where development approval has been given, with conditions made for compensation.

Planning NSW uses guidelines in determining whether development consent is given and the conditions for compensation that apply.

NSW Fisheries

Under the Fisheries Management Act there are provisions for the rehabilitation and compensation of aquatic habitats.

NSW Fisheries policy applies a compensation ratio of 2:1 for vulnerable habitats to maintain a no net loss policy and account for the indirect as well as the direct impacts of development. It requires scientifically rigorous monitoring, with impact and multiple control sites, to determine if the environmental impacts of a development were accurate. A general rule of thumb that is applied is that a change of 20% in a biological indicator one year after the impact should be regarded as a major impact and require environmental compensation.

A Fisheries Conservation Trust Fund has been set up for where a monetary bond is required as compensation, eg up to \$250 000 per hectare for seagrass. The bond is forfeited in the event of a breach of the conditions of consent.

Pre-development habitat compensation is recommended over post-development habitat compensation. In some cases, biota such as mangroves and seagrasses are transplanted from the impact site to the compensation site.



The options outlined have been used in different instances in Australia and overseas, and these examples can provide good learning. While compensation is being addressed in a number of pieces of legislation in NSW and implemented to varying degrees, there now is the need for a clear and consistent approach in implementing compensatory actions, and managing and monitoring them over the long term. Eventually it will be necessary to define who is responsible for what and to define guidelines for implementation across the State.

Minimum Requirements

- Good science and a commitment to improve on this, otherwise we cannot ever know what it is we need to compensate for and what we stand to lose over the long term.
- A sound legal definition of wetlands, based on science and not administrative boundaries.
- The financial and regulatory mechanisms in place to implement compensatory action consistently and firmly, i.e., the DA process with appropriate funding allocated.
- Clear definitions for who is responsible for what – i.e., the role of governments, developers, third parties.
- No net loss of wetlands based on area, functions, values and services. No loss of significant wetlands with high conservation value.
- Wise use of wetlands.
- Rehabilitation of wetlands.
- Adaptive implementation using a suite of compensatory options to apply in different situations.
- Decision-making that considers catchment level function and health.
- Commitment and ability to monitor and manage compensatory wetlands over the long term.
- Monitoring of control sites to monitor natural variations over the long term.
- Protection of water sources throughout catchments to achieve hydrologic equivalence in compensatory wetlands.
- Suitable locations in a catchment to undertake compensatory actions, with appropriate methods and designs for implementation.

The most obvious frameworks for implementing compensatory wetlands in NSW are those that involve development approval. Whole-of-government guidelines should be developed for the implementation of compensatory wetlands and the consistent application of the no net loss policy.



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