

ASSESSING THE APPROPRIATENESS OF WETLAND MITIGATION BANKING AS A MECHANISM FOR SECURING AQUATIC BIODIVERSITY IN THE GRASSLAND BIOME OF SOUTH AFRICA



Prepared for



**National Grasslands
Biodiversity Programme**



**Water Research
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EXECUTIVE SUMMARY

Background

The National Spatial Biodiversity Assessment (NSBA) established that 30% of grasslands in South Africa are irreversibly transformed and only 2.8% are formally conserved. A Grassland Biodiversity Profile and Spatial Biodiversity Priority Assessment was undertaken for the biome which built on the outcomes of the NSBA. The assessment identified and integrated priority areas for terrestrial and river biodiversity, as well as ecosystem services for future conservation action in the grassland biome – the result being the identification of 15 priority clusters for conservation which represent 50% of the biome.

The National Grasslands Biodiversity Programme (NGBP) is seeking to mainstream biodiversity in production landscapes involving the coal mining and agricultural sectors with the aim being for “major production sectors to contribute directly to the achievement of biodiversity conservation priorities in the grassland biome.” The NGBP is investigating both regulatory and market based approaches, and identified offsite mitigation and mitigation banking for wetlands as a concept with the potential to achieve the conservation of aquatic biodiversity within the priority areas of the grassland biome.

Terms of Reference

The terms of reference for this study required that the following main objectives be addressed:

1. An assessment of the appropriateness and feasibility of wetland mitigation banking to secure/sustain inland water biodiversity within the grasslands biome at a demonstration level.
2. Identification of a demonstration site with at least two potential project interventions in each site. The sites need to be located within one of the biodiversity priority clusters and be undertaken with the agriculture or mining sectors.
3. Framework for implementation of mitigation banking at the demonstration sites
4. Recommendations for the way forward.

Methodology

This study has been based primarily on the review and analysis of literature and consultation with relevant role-players and stakeholders. The available resources restricted the consultation to discussion at a high level during which an attempt was made to explain the basic aims and operation of a banking system and obtain feedback from stakeholders regarding the perceived benefits and challenges to implementing the concept in South Africa, as well as suggestions for taking the concept forward.

Limitations

Given that mitigation banking is a new concept in the South African context, the broad level discussions possible within the scope and nature of the investigation have limited the level of detail and understanding achievable. The authors have nevertheless proposed a model that is justified as far as possible based on the evidence and understanding available. It is therefore acknowledged that the recommendations require further investigation. Similarly, the level of investigation limited the thoroughness and detail included in the recommendations related to the proposed pilot project and associated framework for implementation.

Key Findings

The concept of wetland mitigation banking developed in the United States where it has been practised over the past 15 years to meet the country’s policy of ‘no-net loss’ of wetlands. A background to the development of the mechanism is provided in the main report along with a

definition and overview of the concept. This is followed by a more detailed view of the policy, legislation, tools, processes, and the responsibilities of different role-players involved in establishing and operating mitigation banks in the USA.

A review of the available literature revealed that the federal government has recently selected mitigation banking over other mechanisms as the preferred option for offsetting wetland impacts. It holds several advantages when compared to project specific offsite mitigation, which was the mechanism initially implemented in the United States. It would also appear that government support for mitigation banking, along with the potential for third party bankers to benefit financially, has led to an increase in the number and size of banks being developed in the USA.

Despite the increased application of the mechanism, there remains a large body of sceptics with wide ranging criticisms of the mechanism. There are many reviews which document cases where banks have not resulted in effective mitigation of the ecological impacts they are required to offset, and in several instances it is contended that the mechanism has allowed for a 'net-loss' of wetlands – in direct variance with the policy that the mechanism was developed to support. A debate around the effectiveness of mitigation banking in the USA therefore continues to rage despite the national government's recent show of support for the mechanism and ongoing allocation of resources to improve its effectiveness.

The apparent failures of the concept in the USA have prompted the Canadian government to take a decision against employing it in their country which also has a guiding policy of 'no-net loss' of wetlands. The overriding argument against adopting the mechanism in Canada is that "it encourages a commodity approach to conservation wherein wetlands are traded for cash". The Canadian authorities also feel that mitigation banking places emphasis on compensation rather than conservation. Certain states in Canada have developed state managed institutions and models for mitigating wetland impacts, thereby avoiding the influence that the market and potential for profits has on the mechanism in the way it is applied in the USA.

Other countries, such as Australia recognise the potential of mitigation banks but are also wary of the documented limitations. They are considering mitigation banking along with a suite of other mechanism designed to manage and offset the often inevitable impacts to biodiversity associated with ongoing development.

Offsets are increasingly being applied in response to pressure from the significant growth and development agenda in South Africa. The success of these has to date been questionable which has prompted the development of guidelines and standards for designing effective offsets (Western Cape). In the case of wetlands, several cases exist where off-site mitigation has been included as a condition of authorisation for projects that have resulted in 'unavoidable' impacts to wetlands. A review of these cases concluded that the approach to the mitigation has been ad hoc and that there are several issues affecting the sustainability and effectiveness of the wetland offsets implemented to date.

Having established an understanding of mitigation banking, a more detailed analysis of the benefits and limitations of the concept is provided. This provides the basis for assessing whether the mechanism is suitable for the South African context and, if so, whether we have the legislation, tools and any other requirements to implement mitigation banking. Consideration is also given to other mechanisms, specifically off-site mitigation, and whether these are a more suitable option than a banking system.

Conclusions and Recommendations

Given the degraded state of much of the country's wetland resources and the increased threat to wetland resources in certain regions and the growing application of questionable approaches to off-site mitigation measures for wetlands, there is an urgent need to develop policy and guidelines that will improve the effectiveness of offsets.

Mitigation banking is considered to hold several advantages to project-specific off-site mitigation and other mechanisms discussed. However, while the legal instruments available in South Africa are considered adequate and many of tools necessary to implement a bank also exist, the application of mitigation banking as practised in the USA is for various reasons not considered appropriate for South Africa. The model in the USA, which relies on third party bankers, contains too many risks and would place an additional administrative burden on already stretched government departments in this country.

Given the demand for an effective offsets mechanism and the potential benefits offered by a banking system, the study team developed a mitigation banking model considered appropriate to the South African situation. The model differs fundamentally from the USA situation in that it is based on the State, via the Working for Wetlands programme, fulfilling the role of banker and thereby taking responsibility for the planning, implementation and operation of the bank. This structure in itself limits many of the issues that seem to plague the operation of the mechanism in the USA where the state regulates the banks. Further aspects of the model structure are designed in a way that seeks to maximise the benefits of the bank for all role-players which includes a range of government departments, while limiting the risks associated with the technical and institutional issues identified in the review and analysis of the United States experience.

The proposed model is in effect the main structure of a banking system. Discussion is provided regarding the responsibilities of different role-players in activities required at different steps in the bank structure and the tools, data and projected resources necessary to undertake these activities.

While the model is considered feasible and appropriate for the local situation, the preliminary nature of this study means that it can in no way be considered the final product. As proposed by the NGBP, the most effective way of refining the model at a more detailed level and thereby informing policy, will be by testing it in a pilot project within the selected demonstration area.

The study identified the Upper Olifants River Catchment in Mpumalanga as an appropriate catchment in which to test the proposed model. Various wetland offset initiatives were identified in the catchment that are either in the process of being planned or are being implemented. One of these emerged as the preferred project and the relevant mining company have expressed their interest in partnering with WfW in implementing a pilot mitigation bank.

The document concludes with high level recommendations in the form of a framework for implementing the pilot project. The recommendations include proposed location, likely resources and indicators for monitoring success of the pilot.

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LIST OF ACRONYMS

BMA	Biodiversity Management Agreement
CARA	Conservation of Agricultural Resources Act
CMA	Catchment Management Agency
CMAs	Catchment Management Agencies
CMSs	Catchment Management Strategies
Corps	Army Corps of Engineers
CWA	Clean Water Act
DALA	Department of Agriculture and Land Affairs
DEAD	Department of Environmental Affairs and Development Planning
DEAT	Department of Environmental Affairs and Tourism
DECNWS	Department of Environment and Conservation in New South Wales
DME	Department of Minerals and Energy
DWAF	Department of Water Affairs and Forestry
EEP	Ecosystem Enhancement Programme
EIA	Environmental Authorisation Process
EIS	Ecological importance and sensitivity
ELI	Environmental Law Institute
EMC	Ecological Management Category
EMP	Environmental Management Plan
EMPR	Environmental Management Programme Report
EPA	Environmental Protection Agency
ER	Ecological Reserve
FCI	Functional Capacity Index
FWS	Fish and Wildlife Service
HEP	Habitat Evaluation Procedure
HGM	Hydrogeomorphic
HUs	Hydrologic units
ISP	Internal Strategic Perspectives
LAAC	License Application Advisory Committee
MB	Mitigation Banking
MBCP	Mpumalanga Biodiversity Conservation Plan
MBMU	Mitigation Bank Management Unit
MBRT	Mitigation Bank Review Team
MCP	Mpumalanga Conservation Plan
MMTS	Mooi-Mgeni Transfer Scheme
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MPRDA	Minerals and Petroleum Resources Development Act

MTPA	Mpumalanga Tourism and Parks Agency
NAWCC	North American Wetlands Conservation Council
NDA	National Department of Agriculture
NEMA	National Environmental Management Act
NEMBA	National Environmental Management: Biodiversity Act
NGBP	National Grasslands Biodiversity Programme
NMFS	National Marine Fisheries Service
NNL	'No-net loss'
NRCS	Natural Resources Conservation Service
NSBA	National Spatial Biodiversity Assessment
NWA	National Water Act
NWRCS	National Water Resource Classification System
PAA	Protected Areas Act
PCA	Provincial Conservation Agencies
PDRs	Purchase-of-development rights
PES	Present Ecological State
PMU	Project Management Unit
PSOM	Project-Specific Offsite Mitigation
REC	Recommended Ecological Category
RFP	Request for Proposal
RoD	Record of Decision
SANBI	South African National Biodiversity Institute
SMCRA	Surface Mine Control and Reclamation Act
SUAR	Sustainable Use of Agricultural Resources Act
SWANCC	Solid Waste Agency of Northern Cook County
TLW	Targeted Local Watersheds
TOR	Terms of Reference
UMRC	Upper Mooi River Catchment
UORC	Upper Olifants River Catchment
USGS	United States Geological Survey
WAFAM	Washington State Wetland Function Assessment Methods
WET	Wetland Evaluation Technique
WfW	Working for Wetlands
WMAs	Water Management Areas
WMB	Wetland Mitigation Banking
WSSP	Wetland Sector Strategic Plan

1. INTRODUCTION

1.1 Project Background

Grasslands provide essential ecosystems services necessary for economic development, but this very economic development threatens these systems. Consequently grasslands are one of the most threatened biomes in the country as emphasized by the recently completed National Spatial Biodiversity Assessment (NSBA) which established that 30% of grasslands in South Africa are irreversibly transformed and only 2.8% are formally conserved.

In response to this assessment, the National Grasslands Biodiversity Programme (NGBP) was established under the South African National Biodiversity Institute (SANBI). A Grassland Biodiversity Profile and Spatial Biodiversity Priority Assessment were undertaken for the biome which built on the outcomes of the NSBA. The assessment identified and integrated priority areas for terrestrial and river biodiversity, as well as ecosystem services for future conservation action in the grassland biome - the result being the identification of 15 priority clusters for conservation. These clusters represent 50% of the grasslands biome.

The NGBP is seeking to mainstream biodiversity in production landscapes and sectors with the aim being for “major production sectors to contribute directly to the achievement of biodiversity conservation priorities in the grassland biome.” The NGBP is working closely with sectors considered to have a major influence on biodiversity. The agricultural sector has been identified as one, as over 60% of the biome is utilised as rangelands and there is significant pressure for cultivation of remaining grasslands.

The NGBP has also chosen to work with the coal mining sector due to the increased demand for coal which translates into a direct threat to grasslands. Furthermore, the leading players within the mining sector are sensitive to environmental issues. The opportunity therefore exists to develop meaningful interventions within this sector. The NGBP is investigating both regulatory and market based approaches to securing and sustaining aquatic biodiversity within the grassland biome and has identified mitigation banking for wetlands as a concept that requires consideration. Wetland Mitigation Banking (WMB) is the key mechanism applied in the United States to give effect to their policy of ‘no-net loss’ of wetlands, and has been implemented within a regulatory framework over the past two decades. The mechanism is designed to facilitate compliance with regulatory requirements by providing for the establishment of new wetland areas or “banks,” in advance of anticipated losses. Where unavoidable impacts are authorised, developers are able to purchase the banked credits to offset the losses.

The challenge is to assess best practice examples from the application of this concept to see if and how it can be applied to secure/sustain inland water biodiversity within the grassland biome in South Africa. It is intended that such an assessment be undertaken by applying the concept in a pilot project. The lessons learned from these projects will then inform the development of policy to guide the application of these concepts in South Africa. The NGBP has a five year implementation period within which to implement a pilot. This document deals with the first step in this process – investigating whether mitigation banking is an appropriate mechanism to address the challenges faced in South Africa, and if so, how it may be implemented.

1.2 Study Approach

The four main objectives provided in the terms of reference (TOR) are provided below along with the background and methods employed by the study team in addressing each of them.

- 1. An assessment of the appropriateness and feasibility of wetland mitigation banking to secure/sustain inland water biodiversity within the grasslands biome at a demonstration level.*

In the case of wetland mitigation banking, the concept is not without its challenges and shortcomings. Environmentalists in the USA criticize the regulatory authorities for granting too many permits each year and many feel that Off-site Mitigation and Mitigation Banking are an excuse to develop. There are a range of technical and legal/institutional issues that contribute to the views held by sceptics.

It was therefore necessary to consider these issues which have been documented from both points of view in the USA, in assessing the appropriateness and feasibility of applying the concept to the South Africa. This was achieved by:

- Undertaking a literature review of documentation from the United States in which the benefits and limitations of the concept have been recorded and discussed. The references have been captured in PDF format and archived in 'Endnote'¹ as a resource for building on this work.
- Extending the literature review to include a sample of other countries including Australia, Canada, and Uganda. The aim of this review was to establish if these countries had adopted mitigation banking, and if so in what form i.e. have they adapted it to avoid some of the issues prevalent in the USA, and is it proving successful? It was also considered important to understand why other countries may have considered but not adopted the concept – they may have identified fatal flaws, or lacked certain elements considered essential to implementing WMB.
- Engaging people working with the concept in the USA to refine the literature review and obtain first hand insight into issues.
- Reviewing South African examples of off-site mitigation. There are a number of projects where offsets for wetlands have either recently been completed or are in the process of being implemented within South Africa. The reports associated with these projects were reviewed and stakeholders were contacted to obtain their views on the challenges faced in implementing the concept, concerns regarding its appropriateness and the positive outcomes.

Outputs from the review and consultation process include:

- A summary of the regulated process followed in setting up and operating mitigation banks in the USA
- A summary of the technical tools, legal and other instruments required to implement a mitigation bank. These were compared against those available in South Africa to establish what if any need to be developed or adapted in South Africa to implement this mechanism.
- Discussion of the technical, legal and institutional issues that have affected the acceptance of and implementation of the concept in achieving effective offsets. In the case of each issue suggestions are made regarding how these the mechanism could be applied in South Africa, in a way that
 - may avoid or limit the shortcomings identified in the USA
 - be appropriate given the legal and institutional arrangements that exist in South Africa
 - allow for the application of tools, techniques and knowledge of wetlands and wetland rehabilitation in South Africa.

¹ Endnote: is a reference database used for storing, managing, and searching a bibliography.

A banking model is proposed for South Africa based on the work required to meet this requirement of the ToR.

2. *Identification of one demonstration site for wetland mitigation banking with at least two potential project interventions in each within one of the biodiversity priority clusters within the agriculture or mining sectors.*

The usefulness of pilot projects is dependant on the selection of projects with the greatest chance of success. The TOR issued by the NGBP included basic criteria against which the selection of a demonstration site and projects was to be undertaken. These included the need to focus in priority areas for biodiversity within the grasslands biome and the need to work with one of the two focus sectors. The following approach was adopted in selecting the study site and development of projects:

- The base criteria were used to identify potential demonstration areas.
- Additional criteria were set, based on outcomes of the analysis and pre-conditions determined from the activities listed in 1.
- Stakeholders in the area and relevant sector were contacted to obtain input and information for the potential demonstration areas.
- The information was assessed against the criteria to prioritise areas and projects.

3. *Framework for implementation of the demonstration sites*

The terms of reference required that the framework consider:

- What would need to be done in different phases over the broad five year timeframe at an indicator level?
- Identification of key institutions that would be involved in implementation and their willingness to participate
- High level resource requirements for implementation – budget and people.
- Broad brush proposals of indicators against which the demonstration site could be monitored.

The final output of the analysis in this section, is a suggested process for the development and operation of a mitigation bank in South Africa and framework for implementation.

4. *Recommendations for the way forward*

The final section provides a conclusion to the report recommendations regarding a way forward.

2. ORIGINS OF MITIGATION BANKING

The USA established a policy of ‘no-net loss’ (NNL) of wetlands in 1988 under the Bush administration. President Clinton officially endorsed the concept in 1993 with his Administration’s ‘Wetland Plan’. More recently (April 22, 2004) the current President announced a new national goal - to increase America’s wetlands each year, hereby replacing the previous vision of achieving NNL of wetlands with one of ‘net-gain’ (Fleming 2004). The evolution of policy governing wetland mitigation is summarised in Figure 2.1. The legislative and other technical developments necessary to give effect to the policy and to improve the effectiveness of mitigation mechanisms are also summarised.

These policies have been given effect through various pieces of legislation, but primarily the Clean Water Act (CWA) which aims to “restore and maintain the chemical, physical, and biological integrity of the Nation’s waters”. The Clean Water Act is the cornerstone of water protection policy in the United States.” Section 404 of the CWA was created 1974 and requires permits for the discharge of dredged or fill material into the nation’s waters. The permit program

is administered by the Army Corps of Engineers (Corps), with primary oversight from the Environmental Protection Agency (EPA). The EPA retains the right to veto any permit awarded by the Corps. In order to fulfil the NNL policy, a condition of Section 404 permits, is that compensatory mitigation is implemented to offset unavoidable impacts

Compensatory mitigation is defined as, “the restoration, creation, enhancement, or in exceptional cases preservation of wetlands and/or other aquatic resources for the purpose of compensating for unavoidable impacts.” (Federal Guidance, 1995).

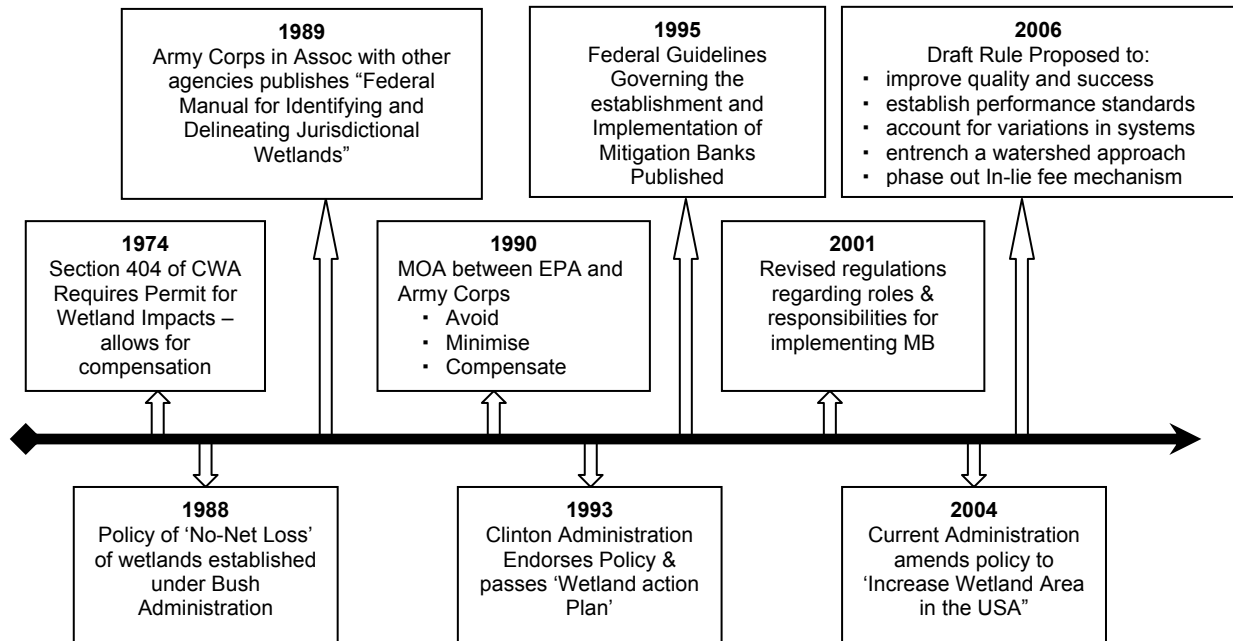


Figure 2.1 Timeline summarising the key policy drivers in the development of mitigation banking in the USA.

Delineating wetlands is a fundamental requirement for assessing impact and the lack of a definition and technical guidelines for delineation had hampered implementation of Section 404 of the CWA and the NNL policy. In response to this need, federal guidelines for the delineation of wetlands were published in 1989.

In 1990 a memorandum of agreement (MOA) signed by all the agencies with regulatory responsibilities for wetland resources. The MOA outlines a sequence of three steps that must be considered when evaluating an application for a section 404 permit.

- First, adverse impacts on wetlands should be avoided when possible;
- Second, when they can not be avoided, impacts should be minimized; and
- Third, where impacts still occur, compensatory mitigation is required.

This “sequencing process” is designed to ensure that there is no net loss of wetland functions (EPA, 2005) and to ensure that compensatory mitigation did not become ‘an excuse to develop’.

Initially these offsets were undertaken on an individual basis in response to permitting conditions. However, as the policy and associated regulatory framework continued to develop, the concept of mitigation banking developed in response to the inefficiencies and other issues associated with implementing offsets on a project specific basis. Mitigation banking has become the preferred mechanism for establishing compliance with regulatory requirements (and national policy). It involves the establishment of new wetland areas, or "banks," in advance of anticipated losses. Wetlands established in a mitigation bank provide "credits" which can be sold to permit applicants, or used by the bank sponsor to meet permit conditions. As mitigation banking

became the preferred mechanism for meeting permit conditions, the Corps and EPA published guidelines in 1995, 2001 and 2006 to improve the effectiveness of mitigation banking and address the limitations and concerns that are discussed later in this document.

3. DEFINING MITIGATION BANKING

Before considering the merits of the mechanism and whether its application in South Africa is appropriate or not, it is necessary to define the concept. This section draws on the USA situation by summarising:

- *What mitigation banking is*
 - different types of compensation,
 - different banking methods.
 - types of banks
 - different banking models
- *How it is implemented*
 - the process for planning, developing and operating a mitigation bank, as provided for in the 1995 guidelines.
 - the tools, institutions and mechanisms involved at each step in the process.

It is with understanding of the mitigation banking established in this section that the issues which have plagued the application of this concept are discussed in following sections.

3.1 Overview of the Concept

A wetland mitigation bank is a wetland area that has been restored, created, enhanced or (in exceptional circumstances) preserved, which is then set aside to compensate for future conversions of wetlands for development activities. The value of a bank is determined by quantifying the wetland functions restored or created in terms of “credits.” Permittees, upon approval of regulatory agencies, can acquire these credits to meet their requirements for compensatory mitigation. The bank sponsor is ultimately responsible for success of the rehabilitation project.

Wetland banks function in a manner very similar to fiscal banks, in that they quantify “credits” and “debits” in terms of wetland area. A wetland mitigation bank is traditionally a large tract of land that a bank sponsor purchases with the express intent of restoring, enhancing, or preserving existing wetlands or creating new wetlands. All operations (i.e. earth moving, species introduction, hydrologic conditions, etc. are managed by the bank sponsor, thereby establishing amounts of area to be used as “credits”.

Unlike a fiscal bank account, credits purchased by the developer or owner may only be used if the Army Corps grants a permit and authorises third-party mitigation. It is the duty of the engineers in the Army Corps to verify that avoidance is not feasible and that mitigation banking is an acceptable form of compensatory mitigation. Furthermore, the Corps is responsible for determining whether the measurable wetland losses are comparable to the credits established in the bank. Because it is difficult to assess the functionality and qualitative importance of a wetland, credits and debits are for simplicity typically balanced in terms of area (acres in the USA).

A hypothetical example is provided below. Assume a bank sponsor purchases 500 acres of land. If the land costs \$2,000 per acre, and the sponsor spends \$3,000 per acre in wetlands creation, restoration and enhancement, the total amount invested by the sponsor would be \$2.5 million.

Soon after, a developer at a nearby location has a project that will alter 25 acres of wetlands (ideally wetlands that are similar to the wetlands established in the bank). The developer will then apply for a section 404 permit and, with permission from the Corps, purchase mitigation “credits” to offset the wetlands losses expected for the project. The bank sponsor may set a price for example of \$10,000 per credit, with each acre representing a credit. The Corps has the right to determine how many credits must be purchased to offset damages to the site.

If it is assumed that 25 acres of wetland destruction requires 25 acres of wetland credit, which at a price of \$10,000 per credit would cost the developer \$250,000. Thereby the bank sponsor is repaid for the restoration and maintenance of the wetland in the bank, and the developer can continue his project without having to undertake any mitigation processes. After selling all of the credits established in the bank, the bank sponsor may choose to maintain the bank in perpetuity, or sell the property to a land trust, government organisation, or conservation group who assumes long-term responsibility for the land. The benefits of this process are twofold. First, the wetlands are created, restored, and maintained prior to wetland destruction (in an ideal situation). Next, the wetland creation and restoration process is performed by a bank sponsor who specializes in wetland science, a skill that most developers lack.

3.2 Types of Compensation

The EPA outlines four methods for generating compensatory credits: establishment (creation), restoration, enhancement, and protection (preservation).

3.2.1 Establishment

Establishing a wetland includes “the development of a wetland or other aquatic resource through manipulation of the physical, chemical or biological characteristics where a wetland did not previously exist.” This process results in an overall gain of wetland area. Maintenance of proper hydrologic conditions is the key to successful wetland creation. Wetland establishment is commonly referred to as ‘creation’.

3.2.2 Restoration

Wetland restoration is defined by the EPA as “the re-establishment or rehabilitation of a wetland or other aquatic resource with the goal of returning natural or historic functions and characteristics to a former or degraded wetland.” This process improves wetland function, and in some cases increases wetland area. Because credits are determined with respect to a baseline, the most seriously degraded sites provide the greatest opportunity for credit production.

3.2.3 Enhancement

Is a process used to “heighten, intensify, or improve” wetland functions such as flood water retention, natural filtration, biodiversity of the region, etc. This process will not yield an increase in wetland area, but does improve wetland function.

3.2.4 Protection/Preservation

Preservation may be accomplished through the implementation of appropriate legal mechanisms (e.g. transfer of land title, conservation easements, restrictive covenants) to protect wetlands, accompanied by changes in land use such as cessation of grazing, cultivation and other incompatible activities. Preservation may also entail physical measures such as fencing and erosion control.

3.3 Types of Wetland Mitigation Banks

The Institute for Water Resources (1995) recognises the following four categories of banks which are defined according to the nature of their sponsorship and clientele.

3.3.1 Single-client banks.

In these banks, the sponsor (e.g., the individual or entity who initiates the bank and produces its credits) is also the principal credit user or client. An example of this category is the many highway related banks which have been established by state departments of transportation and highways for the principal purposes of compensating for wetland losses attributed to their own construction activities. Another prominent example of the single client bank is those sponsored by port authorities.

3.3.2 Joint-project banks.

The objective of this type of bank is to compensate the wetland losses attributed to the construction activities of two or more public agencies or combinations of public and private agencies. The pooling of resources provides for the more efficient production of compensation credits than would be possible separately and also allows wetland management efforts to be better coordinated with local and regional land use plans.

3.3.3 Public-commercial (general use) banks.

The objective of this type of bank is the compensation of wetland losses caused by a broad range of construction activity taking place within a particular area, usually in accordance with a general plan of development. The area is typically urban. Public-commercial (general use) banks are usually sponsored by public entities for compensation of wetland losses caused by a combination of public works projects and private development.

3.3.4 Private-commercial (entrepreneurial) banks.

These are sponsored by private entrepreneurs with the purpose of making compensatory credits available for sale on the open market. The market (or clients) for such credits may include public or private interests.

3.4 Operational Models

Banks have varying modes of operation. The following are examples summarised by Institute of Water Resources (1995).

3.4.1 Debit banks.

The objective of these banks is the production of wetland credits and the expressed maintenance of positive credit balances which are then incrementally withdrawn for the compensation of piecemeal wetland losses. Because these banks have the defining characteristic of intentionally "banked" credits, they fit the textbook definition of banking and are frequently referred to as classic or *a priori* banks.

3.4.2 Zero-balance banks.

This category of banks provide for the piecemeal compensation of wetland losses on a more or less "pay-as-you-go basis" through the equally piecemeal production of credits. The initial intention of such arrangements is the compensation of individual wetland losses as the losses take place; however, such compensation typically takes place within a discrete area. In such banks, the advanced production of a large block of compensation credits does not take place and therefore, credits are not intentionally "banked." However, wetland management efforts which happen to be in excess of instant mitigation needs often inadvertently result in positive credit balances which are then "maintained on the books" as they are in *a priori* banks for the compensation of future wetland losses.

3.4.3 Accounting systems

The basic objective of these systems is to maintain running accounts of all wetland losses due to developmental and agricultural activities and to all wetland gains resulting from wetland restoration and creation projects taking place within a discrete area, normally on a state wide basis.

4. IMPLEMENTING MITIGATION BANKS – AN OVERVIEW OF POLICY REQUIREMENTS AND THE PROCESS

In November, 1995 the Federal Guidance for the Establishment, Use and Operation of Mitigation Banks (Federal Guidance) was entered into the Federal Register with input from the following five federal agencies: Environmental Protection Agency (EPA), Army Corps of Engineers, Natural Resources Conservation Service (NRCS), Fish and Wildlife Service (FWS), and National Marine Fisheries Service (NMFS) (Jeffrey, 1997).

These guidelines summarise the various steps required to establish, implement and operate a mitigation bank in the USA. They also provide the justification for the requirements and various mechanisms applied at each point in the process. This section is an extract from the guidelines which covers the following:

- Bank planning
- Success and criteria monitoring
- Determination of credits and debits
- Accounting procedures and formats
- Financial and legal assurances

The section is considered important because it summarises the thinking that has gone into mitigation banking based on experience and lessons learned over time. It also provides a clear summary of the responsibilities on various role-players and the administrative and institutional requirements that have developed in the USA as the concept of mechanism has evolved.

4.1 Bank Planning

4.1.1 Bank Initiation

The bank sponsor approaches the relevant authority with an outline of the needs, goals and objectives of the bank, potential clients and physical resources to implement rehabilitation. At this initial stage the authority convenes an informal meeting with the bank sponsor and potential participants on a Mitigation Bank Review Team (MBRT)². Such a meeting would provide the sponsor with an opportunity to describe bank plans in conceptual terms and to obtain advice from the agencies on preparation of a formal prospectus.

Based on this input, the sponsor submits a detailed formal prospectus that should identify the bank's goals and operational objectives and outline credit production methods (creation, restoration, protection) in sufficient detail to allow a preliminary assessment of its technical feasibility. After submission of the detailed prospectus, the relevant agencies would formally constitute a MBRT for the proposed bank.

² MBRT – An interagency group of Federal, state, tribal and/or local regulatory and resource agency representatives which are signatory to a banking instrument and oversee the establishment, use and operation of a mitigation bank.

4.1.2 Prospectus

The prospectus should include information of an administrative, technical and operational nature, as follows:

Administrative:

- Identity of the sponsor and manager.
- Classification and description of bank (e.g., whether single client, general use; identity of potential users, etc.).
- Nature of real estate interests.

Technical:

- Location and size of bank.
- Technical classification and condition of existing bank lands, wetlands and other aquatic habitats (baseline conditions).
- Location, classification, functions, and condition of potential debiting wetlands to the extent they can be identified.
- Proposed methods to be used, together with the description of any physical improvements to be made, for the production and maintenance of compensatory credits.
- Proposed methods and procedures to be used to determine the number of credits and debits.

Operational:

- Operational objectives, including delineation of bank's proposed service area and specification of the functions and wetland class and habitat types to be produced for credits.
- Proposed monitoring and contingency plans.
- The prospectus is submitted to the regulatory authority which circulates it to other member agencies of the MBRT. The prospectus should be supplemented with verbal briefings by the bank sponsor, following which the MBRT should subject it to critical review in conjunction with site inspections as required.

Review and approval of the prospectus may be an iterative process involving successive revisions by the sponsor. Technical feasibility, however, should not be interpreted by a bank sponsor as an indication that the MBRT considers the proposed bank to be economically viable. Such decisions should be based on their merits during actual bank operation.

Following a determination of technical feasibility, the bank sponsor requests authority to facilitate development of the banking instrument prior to undertaking detailed bank planning.

4.1.3 Development of the Banking Instrument

The banking instrument is an interagency agreement to which the bank sponsor, regulatory and resource agencies are signatories. All banks are required to have such an agreement. An interagency agreement can be a stand-alone document and the sole guide for the planning, implementation and operation of a bank, or is part of the permit or plan. The sponsor is responsible for the preparation of the agreement, based on advice and guidance provided by the MBRT.

It is required that the physical, legal and administrative characteristics of the bank and guidelines under which the bank will be developed, implemented and operated are detailed in this agreement. Detailed bank establishment plans, crediting and debiting methodology may be incorporated into the interagency agreement as appendices.

The guidelines require that the administrative and operational provisions of the interagency banking agreement responsibilities of the sponsor be clearly identified and stated in a legally binding manner.

4.1.4 Goal Setting and Site selection

The guidelines require that the *“goal of a mitigation bank should be the establishment of a self-sustaining ecosystem which replaces the functions and acreage of wetlands anticipated to be affected within a particular watershed or other appropriate area (service area).”* Prospective bank sponsors are encouraged to establish bank goals, and to strategically site banks based on the analysis of such needs and opportunities. Information used in assessing the needs and opportunities in an area include:

- Current and future (planned) land-uses.
- Local and regional economic trends and projections.
- Land zoning.
- State of natural resources and trends in the alteration of these.
- Watershed management plans.
- Wetland inventory data.

In the USA there is a range of State, regional and local planning processes required under various legislation that include wetlands, with the focus varying depending on the aims of the legislation.

The mitigation site should be selected with the aim of achieving goals that aim to:

- *Develop or enhance specific wetland functions in critical areas through the strategic restoration, creation or enhancement of wetlands (e.g. improving water quality by the action of fringe or riparian wetlands; providing flood control by intercepting runoff);*
- *Synergistically enhance the value of existing wetland and non-wetland areas (e.g. existing public or private park and recreational areas, wildlife management areas, etc.) through proximal location.*
- *Provide an opportunity to improve land use patterns within a watershed or other designated area (e.g. providing open space and environmental corridors; providing buffers between and among residential, commercial and industrial developments).*

4.1.5 Establishment of Operational Objectives

The geographic extent of the bank service area should, to the extent environmentally desirable, be guided by hydrologic and biotic criteria. Appropriate hydrologic guidelines are provided by the "Hydrologic Unit Map of the United States", U.S. Geological Survey, 1980. Examples of biotic zonation at the national level are "Ecoregions of the United States" by James M. Omernik, 1986 (EPA, Corvallis Environmental Research Laboratory, Corvallis, Oregon) and "Descriptions of Ecoregions of the United States by Robert G. Bailey (USDA, 1980).

Several states are known to have adopted geographic limits for general mitigation purposes, including mitigation banks. Some emphasize habitat values and specify location within the same biotic region, while others call for consideration of both hydrologic and biotic factors. The federal guidelines suggest that compensation can best be achieved by

- in-kind replacement of wetlands in close proximity to the impact site.
- a bank service area providing the greatest likelihood of functional replacement would be one confined to the smallest possible geographic, biotic, or hydrologic area.

Operational objectives encompass the following:

- Identification of the specific functions and habitat types a bank is capable of replacing.
- Delineation, in spatial or hydrologic drainage terms, of the bank's service area (i.e. that surface area or lineal distance within which a bank can reasonably be expected to compensate for the loss of wetland functions).

4.2 Success Criteria and Monitoring

4.2.1 Overview and Purpose

Success criteria are a set of standards that are employed in order to evaluate the status of a bank's physical and functional development. Evaluation of the bank criteria should commence soon after its initial establishment and at regular intervals throughout its operational life. The purpose of such evaluation is to gauge progress in the development of compensatory mitigation credits pursuant to approving their availability for withdrawal. Success criteria should involve:

- Multiple parameters which are geared to the diverse physical and functional attributes of wetlands.
- Be determined by the bank sponsor using monitoring techniques and success criteria which have been agreed to and documented in the banking instrument.
- Performance (or success) "thresholds" which can be explicitly linked by the authorising agency to certification of credits.

4.2.2 Success Criteria

Success criteria allow for the determination of whether an aquatic resource is capable of providing specific functions. The ability of an aquatic resource to perform a function may be determined by assessing its structural components and/or evaluation of its functional characteristics.

Structural components of aquatic resources allow performance of physical, biological, chemical processes. In the case of wetlands, these structural components consist of specific hydrological, edaphic, and vegetation adapted to or developed in these aquatic resources.

- *Hydrology*

Experience shows that the principal reason for total or partial failure of compensation projects, particularly wetland replacement efforts, is faulty hydrology which is traceable in most cases to improper design and construction rather than to natural factors. Therefore, it is of utmost importance that bank plans include explicit design criteria which are approved by the MBRT and documented in the banking instrument.

- *Soil*

The suitability of soils is a factor principally in instances of wetland creation, and secondarily in restoration project areas in which native soils have been seriously disturbed. Although suitability of soil for establishment of a wetland mitigation bank is a significant factor for ecological success, it should be addressed during the initial bank siting and may not be suited for use as a success criterion.

- *Vegetation.*

The status of vegetative development in banks should be determined using as standard vegetative norms as they occur in the area in which the bank is located. The principal factors considered in the development of success criteria should be:

- (a) extent or pattern of coverage,
- (b) density or number of stems per unit area, and
- (c) individual rate of growth.

- *Functional Characteristics.*

Assessment of functional goals of a mitigation bank in addition to the structural success criteria may be used to gauge development of a mitigation bank. The ability of wetlands to perform recognized physical functions (wildlife habitat, water quality improvement, floodwater storage, groundwater recharge and discharge) is site specific and in majority of cases develops over time. Use of functional success criteria alone for sale of credits is not recommended because of the temporal aspects of development of wetland functions.

Typically, functions performed by a wetland are assessed through the direct, on-site analysis and measurement of animal and plant populations and ecological relationships using success criteria and study procedures which are tailored to the situation.

4.2.3 Monitoring

A program of periodic monitoring, with provision for rectification of any human and natural problems, should be instituted in order to assure that bank development and management is in accordance with established technical specifications and to validate the availability of compensation credits. A monitoring plan should:

- Cover the lifespan of the bank. The frequency of monitoring may vary depending on the credit production methods and the nature of the wetlands involved. For example, a bank comprising an emergent intertidal marsh or a lacustrine fishery habitat could become functionally mature within a few years and the monitoring schedule could follow an equally tight time-frame
- Apply to the entire area of the bank and accommodate different phases in the implementation of the bank.
- Culminate in written reports which are submitted to the authorising agency and distributed to the MBRT for review. These reports should provide sufficient written and graphic descriptions of bank conditions to enable to evaluate the effectiveness of wetland management and to verify the availability of credits.
- Should also be responsive to special circumstances that exist on a case-by-case basis. Banks that have uncertain water sources, marginal soils, or other systemic problems that heighten the risk of failure should be monitored on a more frequent basis.

4.3 Determination of Credits and Debits

4.3.1 Credit production techniques

The production and maintenance of credits can be done using one or a possible combination of methods i.e. creation, restoration, enhancement of protection. Experience has shown that the different methods have differing rates of success in terms of establishing wetland area and functioning, which converts to higher credits. Consequently the regulatory agencies in the USA have prioritised these methods (the merits of the different techniques are discussed in more detail in section 8).

4.3.2 Designing for Maintenance

An underlying objective in mitigation banking is the development of self-sustaining wetland systems. Banks which are not self-sustaining and require extensive maintenance introduce a higher probability of failure which can jeopardize the basic purpose of a bank. Banks which carry a high risk of failure may need to consider commensurately high compensation ratios and/or require the sponsor to provide an appropriate level of financial assurances.

4.3.3 Baseline documentation

Baseline documentation is an essential element of detailed bank planning. Its purpose is to characterize the "base" above which a mitigation bank is developed, its success is determined, and above which the type and amount of compensatory credits are measured. The term "baseline conditions" refers to conditions which exist at the time the bank is proposed to be implemented as well as conditions which are expected to prevail in the future under a "without bank" scenario. The exact technical requirements for baseline documentation should be developed on a case-by-case basis given the site-specificity of bank proposals.

The USA guidelines list 14 aspects that should be included in the contents of baseline documentation reports and which include the following:

- Hydrology -- surface and/or groundwater sources; surface and groundwater elevations; duration, frequency and depth of surface water inundation or soil saturation;

bathymetry of deep water areas; circulation pattern and rate of replacement: water quality; salinity.

- Description and mapping of any existing water control structures.
- Description, mapping and functional evaluation of existing wetlands.
- Soil series and soil mapping.
- Topography and vegetation of upland and transition areas within and surrounding the bank area and their effect on the evaluation of the overall bank area.
- Physical and biological characteristics of existing deep water environments and their effect on the evaluation of the overall bank area.
- Description and mapping of cultural resources features.
- Description of present and future land uses within and surrounding the bank and their probable effects on the bank's prospective functions and values.
- Determination of potential preservation credits for existing wetlands.
- Designation of sample plots, transects and reference sites. Sites should be sufficient in number to represent the full spectrum of cover types; topographic, hydrologic and soil regimes; prospective wetland types and aquatic resources and management activities taking place within the bank.
- Establishment of test wells and staff gauges, as necessary, for the determination of hydrology and soil moisture levels under pre- and post-bank conditions.
- Detailed site map; mapping should be at the largest possible scale, preferably using available topographic maps or aerial photographs as a base.
- Ground-level and low-level aerial oblique colour photographs of representative bank areas (to assist future monitoring and the determination of credits).

4.3.4 Evaluation of Credits and Debits

In all cases, the amount of credits in a bank is a net increase of the functions due to implementation of the bank, which means that credit determination must take baseline functions into consideration. The proper evaluation of credits therefore requires pre- and post-project evaluation. In like manner, determination of authorized losses (debits) should also take into account qualitative changes over time due to effects which might be unrelated to the immediate causative factors. Determination of debits should employ the same methods which are used to determine credits. Wetland credits and debits may be measured in either area or functional units.

It is desirable to use an approach that can be documented, consistently applied (by different individuals or by the same individual at different times), allows quantitative and qualitative assessment of wetland functions, and one that can be used to compare existing conditions with future conditions. Credits and debits should be enumerated according to wetland type or other aquatic habitat classification.

The Federal Guidelines do not prescribe whether 'area' or 'functional units' can be specified as are the correct measure for credits and debits. Several criteria need to be evaluated on a case-by-case basis to select the appropriate credit and debit unit (Figure 4.1). In general, the need to use functional units rather than acreage increases with the significance and complexity of the system, the size of the bank and size of the debiting losses, and interest in a particular function. However, the use of hectareage may be required when the knowledge of functions, availability of assessment techniques, or availability of expertise is low. Local factors may also affect the selection of credit/debit units.

There are four general classes of methods for determining credits and debits consisting of inventory (uses acreage units), expert scoring (subjective scoring), diversity/production indices (semi-quantitative), and functional evaluation methodologies (single function or multiple function methods).

The USA guidelines suggest considering the queries listed in Figure 4.1 in determining the method to be used for evaluating credits. The further right on the scale the factors are judged to be, the more important it is to use a functional evaluation. If the majority of the factors are considered low, then acres of certain wetland types may suffice as the basis to determine credits and debits.

ACRES	FUNCTION
LOW-----HIGH	Interest in individual functions
LOW-----HIGH	Knowledge of individual functions
LOW-----HIGH	Availability of usable evaluation tools
LOW-----HIGH	Availability of expertise
LOW-----HIGH	Significance of wetlands in the bank
LOW-----HIGH	Significance of debiting wetland
LOW-----HIGH	Acres in mitigation bank
LOW-----HIGH	Average acres in each debiting wetland
LOW-----HIGH	(Other locally determined decision factors)

Figure 4.1 Decision support tool for selection of basis for determining credits

4.3.5 Determination of Compensation Ratios

The compensation ratio is the number of units of credit (acreage or functional units) which need to be debited from a bank to compensate for one unit of wetlands lost.

Compensation ratios are determined by the Corps and NRCS on a case-by-case basis. They do not remain static - as they are subject to adjustment upward or downward as biological, physical and chemical conditions (i.e. credit valuation) at a bank change over time. Such adjustments should normally take place coincident with periodic bank monitoring. Some MBRTs may want to identify and document in the banking instrument the protocol by which compensation ratios are to be determined on a case-by-case basis. Factors for consideration in the determination of compensation ratios included the following:

- *State of bank development at time of debiting.*

When the bank resources are functionally equivalent to the wetlands which are lost, a compensation ratio of "1 debit to 1 credit" may be appropriate. However, when bank resources are not yet functionally mature, their replacement value may be modified by the extent of functional deficiency. For example, if a bank's state of development at the time of debiting has been determined to be 25% of anticipated functional maturity, credits should be discounted by a factor of 4 (i.e. 100% divided by 25%).

- *Quality of bank resources in relation to the quality of debiting wetlands.*

This factor refers to the comparative significance of the respective resource areas in terms of the extent of physical and biological functions which they perform and the values which are ascribed to such functions. For example, if bank wetlands perform twice as many functions, or important functions are performed twice as well as debiting areas, the bank is clearly of superior quality and its credits could therefore be traded at a premium.

- *Sustainability of bank resources.*

This factor refers to the relative ease or difficulty of maintaining the physical and functional integrity of a bank and the associated risk of failure of maintenance efforts. If a bank is designed to be entirely self-sustaining (e.g., possess dependable, hydrologic sources, and have minimal dependence on man-made features), risk of failure is minimal, and there should be no need to discount the value of credits. On the other hand, a bank which relies on engineering features which are subject to potential failure, requires continuous manipulation of its life support systems, and otherwise has a high degree of artificiality, has a decidedly increased risk for failure.

4.3.6 Credit Certification and Timing of Credit Withdrawal

The guidelines state that "the number of credits available for withdrawal (i.e. debiting) should generally be commensurate with the level of aquatic functions attained at a bank at the time of debiting." The level of aquatic functions is based on the attainment of performance criteria or use of a functional assessment methodology. Flexibility is offered in that credits may be withdrawn based upon a projected level of aquatic functions at a bank.

However, prior to any debiting at a bank, the following must be satisfied:

- banking instrument and final mitigation plans have been approved,
- the bank site must be secured through real estate assurances, and
- appropriate financial assurances are in place.

In the case of banks where credit production is based solely on the preservation of existing aquatic resources, credits may become available for debiting once the appropriate legal protection, banking instrument, land use and physical changes as necessary, are implemented.

A bank may become operational initially when credits are certified by the authorising agency. Credits are said to be "certified" at a point in time when the authorising agency has determined the number of credits available for withdrawal. The determination of certification is based upon meeting minimum requirements stipulated in the banking instrument. For example, certification of credits based upon the attainment of prescribed success criteria demonstrating bank successful establishment, will likely require information (e.g. bank development plans, job completion report, performance monitoring reports) to be submitted by the bank sponsor to the authorising agency for review. Such information may be supplemented by site inspection conducted by the authorising agency and MBRT.

In another example, a limited number of credits may become certified on the basis of design criteria for a bank. Subsequent certification of remaining bank credits should take place incrementally as bank development progresses as evidenced by monitoring results and satisfactory achievement of success criteria. In the case of banks wherein the sole basis of credit production is preservation of existing aquatic resources, credits may be certified immediately upon the implementation of legal protection, approval of the banking instrument, accompanied by changes in land use, or other physical changes. In all cases, credits that are based on projected biological conditions must be verified through periodic monitoring, and if credits do not agree with predictions, adjustments of credit balances upward or downward will be necessary. If there is a shortfall in available credits it may also be necessary to suspend bank operation and for the sponsor to identify the causes for retarded bank development and take appropriate corrective action.

4.4 Accounting Procedures and Formats

The bank sponsor is required to maintain up-to-date records of all banking activities including:

- *Annual Ledger*
This ledger should be forwarded to the authorising agency on a yearly basis along with the monitoring and maintenance report. The authorising agency may also require bank audits on an as-needed basis throughout the bank operational life. Justification for audits may be the existence of discrepancies in accounting records or physical changes in a bank which significantly affect credit status. In the latter event it would be appropriate to call for audits in conjunction with monitoring events.
- *Audits*
Audits are the agency's responsibility.
- *Individual Statements*
Statements are prepared at the time of each transaction to reflect the activity. Statements are then forwarded to the authorising agency at the time they are generated; the annual ledger statements should be submitted following each
 - debiting action,
 - increment of credits added to a bank,
 - performance monitoring event.

Statements should provide running accounts of banking activity from the initial credit approval by the MBRT to the latest accounting. The statements should document all debits (referring to the Corps permit number, any credit additions, and credit balances. Separate accounts should be provided for all wetland classes in a bank as specified in the banking instrument.

4.5 Financial and Legal Assurances

The bank sponsor is responsible for securing sufficient funds or other financial assurances to cover contingency actions in the event of bank default or failure. Further, the wetlands and/or other aquatic resources in a mitigation bank should be protected as specified in the banking instrument with appropriate real estate arrangements.

4.5.1 Financial Assurances

Financial assurance mechanisms can provide funds to undertake contingency or remedial actions in the event of technical failure or sponsor's default. Financial assurance for remedial actions may be needed as a condition to allow early debiting of projected credits (credits not yet established). These funds would be used in the event the debited credits do not meet the success criteria or in cases where conditions of debited credits deteriorate during the operational life of a bank. Financial assurance mechanisms can also be used to assure availability of funds for long-term maintenance of a bank. Early debiting of credits may be approved to reduce the financial burden of the sponsor, while minimizing the affect of the bank's failure.

The nature of remedial actions to be taken in the event of partial or total bank failure depends on the nature of causative factors. For example, remedial actions in response to failure due to catastrophic events or natural phenomena (e.g. drought, flood, disease) are not considered feasible.

When remedial actions have been completed and determined to be in accord with the success criteria, the relevant amount of financial assurance should be released by the regulatory authority. Stipulations pertaining to timing of credit withdrawal, contingency actions in the event of technical bank failure, and sponsor's default together with financial requirements for long-term management of the bank should be explicitly noted in the banking instrument.

In the event of default or abandonment, the regulatory authority may decide (in consultation with the institution or agency which provides the financial assurances) to:

- Terminate the bank and debiting banks located elsewhere or
- Designate a public or private entity to either take over maintenance or continue operation of the bank in accord with initial plans or a scale-down version of the bank.

The range of remedial actions which are available when bank failure is due to controllable human factors (e.g. faulty hydrology design, poor quality planting stock or planting technique) depends on the time at which failure is detected. If failure is detected prior to debiting, the bank sponsor would have the option of either abandoning the bank or taking action to correct deficiencies. If failure due to controllable conditions occurs after debiting has taken place and the bank's physical problems jeopardize the existence of the credits that have been debited, authorization for further debiting should be immediately suspended pending remedial measures to correct adverse conditions. Failure to institute remedial measures may result in revocation of permits and, other legal measures to force compliance, including forfeiture of financial assurances. Typically, forfeiture of financial assurance funds would not be affected, in cases where there is a positive balance of credits in the bank and there is minimal ecological risk that those credits will be lessened or lost. Bank sponsors should be required to provide proof of financial responsibility prior to and as a condition to certification of credits.

4.5.2 Long Term Management and Protection

One of the functions of the MBRT is to provide bank sponsors with assistance in the identification of long-term maintenance needs together with their funding and logistical requirements. The authorising agency also continuously evaluates the adequacy of maintenance through the review of monitoring reports and on-site inspections.

Mitigation banks should be dedicated to compensatory mitigation purposes in perpetuity unless a shorter time-frame is approved by the MBRT. Legal instruments such as:

- conservation easements,
- deed restrictions,
- restrictive covenants, or
- title transfers,

may be acceptable mechanisms to provide long-term assurances. Such legal instruments should acknowledge the primary use of bank lands and waters for mitigation purposes and restrict other uses to activities which are compatible with that use. Activities which may not be physically disruptive such as non-intensive outdoor recreation, recreational hunting and fishing, research and nature study are generally regarded as compatible uses. However, activities which are clearly physically disruptive such as surface mining and agricultural cultivation (unless specifically required for wetland management) are in general viewed as incompatible with bank purposes.

4.5.3 Types of Financial Surety

Financial assurances may be in the form of surety bonding, collateral bonding, self bonding, or alternative bonding as defined below:

4.5.3.1 Surety Bonding

A surety bond is an indemnity contract in a sum whereby a surety agrees to assume the responsibilities for default on the debts or obligations of another party (i.e. the sponsor of the bank). The surety bond is supported by the guarantee of a corporation licensed to do business as a surety. Financial responsibility for failure to fulfil its mitigation obligations is assumed by a surety company. There are two types of surety bonds relevant for mitigation banking--payment bonds and performance bonds. A payment bond (sometimes called a financial guarantee bond) is an assurance contract whereby a surety agrees to pay the full face amount of the bond (the penal sum) to the beneficiary if the principal fails to fulfil stated obligations. A performance bond is an assurance contract whereby a surety agrees either to pay the penal sum of the bond or to perform the principal's obligations in the event that the principal fails to do so.

4.5.3.2 Collateral Bonding

A collateral bond can be defined as an indemnity contract in a sum executed by the mitigation banker (as principal) and made payable to regulatory authority (as beneficiary), which is supported by the provision of some form of "security". A security is defined as an obligation, pledge, mortgage, deposit, etc. given by a debtor in order to make sure the payment or performance of his debt, by furnishing the creditor with a resource to be used in case of failure in the principal obligation. Financial responsibility is retained by the mitigation bank sponsor through the provision of security which would be subject to forfeiture in the event that mitigation obligations were not fulfilled. There are a variety of collateral bonding options which vary according to the manner in which security is held and made available to the beneficiary in the event of forfeiture.

- *Letter of Credit*

A letter of credit provides for the extension of the credit of one party, such as a commercial bank or other financial institution (the issuer), on behalf of a second party (mitigation bank sponsor), to a third party (regulatory authority). The issuer allows the beneficiary to draw up to a specified sum of money from the credit account upon demand. Letters of credit are typically stipulated to be irrevocable and issued for at least one year.

- *Security in Escrow*

An escrow is an agreement between two parties, a grantor (mitigation bank sponsor) and a grantee (regulatory authority) to transfer ownership of certain property (real or personal) from the former to the latter upon some stated condition or event. A neutral third party such as a commercial bank or other financial institution (the depositary) is appointed to receive the property (or deed thereto) and to assure its transfer as specified in the escrow agreement. Legal title to the property remains with the grantor; however, after the property has been properly delivered to the depositary, neither the grantor nor the grantee can obtain it without mutual agreement or in the absence of fulfilment of the terms of the escrow agreement. Various forms of personal property, including cash, certificates of deposit, or marketable U.S. government bonds could be held in an account established at a financial institution accompanied by a written agreement by that institution to pay the regulatory authority upon demand in the event of forfeiture. If the mitigation banker fails to fulfil its obligations, then title to the property held in escrow would pass to the regulatory authority or to an entity designated by the regulatory authority. If, on other hand, the mitigation bank fulfilled its obligations, the property held in escrow would be returned to the mitigation bank sponsor.

- *Security in Trust*

A trust is an arrangement enabling property, real or personal, to be held by one party (trustee/financial institution) for the benefit of another party (beneficiary/ regulatory authority). Unlike an escrow, a trust is a right of property; the trustee becomes the legal owner of the trust property (the "trust deposit"), although the beneficiary has an equitable interest in it. The trust deposit must be kept intact and not commingled with other property of the trustee, and must be devoted exclusively to the particular purposes outlined by the trust agreement. A trust could be structured as an indemnity contract similar to an escrow. Such a trust would stipulate that the trust deposit must be devoted to a particular obligation of the depositor (mitigation bank sponsor) in the event that it is not otherwise fulfilled by the depositor, and returned in kind to the depositor if the obligation is fulfilled. In the event that a mitigation bank sponsor who used real property in trust as assurance option defaulted on its obligation, the trustee would sell the property and provide the proceeds to an entity designated by the regulatory authority. Trust funds have been used to provide long-term management of some mitigation parcel.

▪ *Other Security Interest*

Security interest in property may also be provided directly by a mitigation banker to an entity designated by the regulatory authority through an indemnity contract structured as a "pledge". The necessary conditions for a contract to constitute a pledge include: 1) possession of the pledged property must pass from the pledgor to the pledgee (though it may only be constructive), 2) legal title to the property must remain with the pledgor, and 3) the pledgee must have a lien on the property for performance of an obligation due him by the pledgor. In the event that the pledgor defaults on the obligation, the property would be sold and the pledgee would receive only so much of the proceeds that are necessary to perform the pledgor's obligation (Black, 1968). Various forms of personal property could be pledged by mitigation bankers to parties designated by the regulatory authority as security interest. The forms that might be most acceptable to regulators include cash, certificates of deposits, or other cash equivalents (e.g. money orders, certified bank drafts), negotiable U.S. government bonds, investment grade securities (e.g. corporate bonds having a high credit rating), as well as real property either through a pledge or as a mortgage (involves transfer of title). Cash could be deposited directly with the regulatory authority-designated entity, and negotiable certificates of deposit and bonds could be assigned or endorsed to that entity and placed in its possession. Regulators will not want to hold securities provided as assurances. As such, securities can sometimes be held by a financial institution without necessitating the establishment of an escrow account. For example, personal assets held in book entry form at a financial institution can be pledged in favour of the regulatory authority simply by having the financial institution place a notation against the book entry account.

4.5.3.3 Self Bonding.

Self bonding is an indemnity agreement in a sum certain executed by the regulated party (mitigation banker), or by the regulated party and a corporate guarantor (a parent or non-parent company), and made payable to an entity designated by the regulatory authority. Unlike surety or collateral bonds, self bonds are not supported by the guarantee of a licensed surety nor by security interest. In the context of mitigation banking, self bonding would allow a mitigation bank sponsor (or its guarantor) to guarantee performance without incurring any cost until the regulatory authority determined that the bank had defaulted on its obligations. In that event, the banker (or his guarantor) would be liable to fulfil the terms of the indemnity agreement, either through the performance of the obligation or through the payment of a specified sum of money to an entity designated by the regulator to fulfil the terms. In some environmental contexts, self bonding is allowed provided that the regulated party or its guarantor meets certain financial tests.

4.5.3.4 Alternative Financial Assurance Mechanisms.

Various other assurance options may be potentially applicable to the mitigation banking context. For example, a "bond/assurance pool" whereby the regulatory authority acts much like an insurance company to pool risks across a portfolio of mitigation banks in a given watershed or region may be workable for mitigation banking. In the Surface Mine Control and Reclamation Act (SMCRA) bonding context, for example, a number of states have been given approval to develop such alternative assurance systems which generally include two components: 1) a flat (or sliding scale) rate per acre bond, and 2) a supplemental state reclamation fund capitalized with permit fees, taxes on mine production, and monetary penalties paid by operators. When an operator defaults on his permit obligations, the flat rate bond amount is applied first to recover site reclamation costs incurred by the regulatory authority, and the supplemental fund is used to make up any shortfall (see: McElfish and Beier, 1990). Such an assurance alternative could in principal also be used in the mitigation banking context (See IWR, 1995). For example, the regulatory authority may allow mitigation banks to post financial assurance using one of the methods described above, set at a fixed dollar rate per acre or at a rate which sets individual assurances at some percentage of bank-specific mitigation costs. A supplemental mitigation trust fund could then be established by an entity designated by the regulatory authority and funded with a one-time, non-refundable bank permit fee applied to each bank, as well as a taxes imposed

on each credit sold. The supplemental fund would then be used by designee of the regulatory authority, as needed, to repair or replace mitigation sites when the assurance monies posted by the individual banks were insufficient to cover bank-specific mitigation costs.

4.5.4 Selection of Financial Assurance

Selection of the type of financial assurance as the collateral occurs after careful review and analysis by the Corps or NRCS legal staff. Preliminary assessment, however, should consider reliability and availability of an assurance option without the administrative burden to the regulatory authority. In addition, consideration should be given to implementation cost and the degree that the financial assurance mechanism provides an incentive for the sponsor to fulfil the mitigation requirements. For example, letters of credit meet the criteria for availability, reliability, low implementation cost to sponsors while providing a strong incentive to fulfil mitigation obligations, and low administrative burden to the regulators (See IWR, 1995).

4.5.5 Amount of Financial Assurance

The amount of financial assurance should be sufficient to complete the bank's construction, planting, maintenance, and monitoring during the operational life for credits that have been certified. Since implementation costs vary with type of mitigation banks, the amount of financial assurance necessary for remedial actions is determined on a case-by-case basis. The amount may be based on the worst-case assumption of cost that is if the regulatory agency or its contractor would assume to complete the mitigation plan in addition to its administrative cost.

4.5.6 Release of Financial Assurance

The MBRT may conduct site visits to evaluate the conditions of the credits in the mitigation bank and compare them with the established performance standards or success criteria. The construction and planting portion of the financial assurance may be released upon approval by the Corps or NRCS specified as per conditions specified in the banking instrument. In some cases, as per the banking instrument, portions of the financial assurance funds may be released to the bank sponsor commensurate to achievement of performance standards. The portion of funds for maintenance and monitoring of the bank would be released at the end of the operational life of the mitigation bank. The long-term maintenance costs would remain with the entity designated responsible for maintaining the mitigation bank in perpetuity.

If during the compliance visits the MBRT determines the mitigation bank is operating in deficit (conditions of the bank has deteriorated), use of the bank is immediately ceased, and remedial actions are recommended. If remedial actions are not implemented, or the bank is abandoned, total amount of financial assurance is forfeited in addition to other legal measures as allowed by the regulatory authority of the permitting agency. The regulatory agency may then designate a public or private non-profit entity or obtain the services of a contractor to implement the necessary remedial activities.

Table 4.1 summaries the sequence of steps that would be undertaken in planning, implementing and operating a mitigation bank. The responsibility of the various role players is listed at each step in the process.

Table 4.1 Summary of steps taken in planning, implementing and operating a mitigation bank in the USA

PLANNING & DESIGN	
ID need and opportunity	• Establish bank objectives • Identify clients • ID physical resources & methods for production of credits (e.g. enhancement)
Initial meeting with Regulatory Authority	• Obtain guidance on concept • ID potential members of Mitigation Bank Review Team (MBRT)
Prepare Formal Banking Prospectus (Detailed document - allows for assessment of technical and financial feasibility)	Should include following detail: • Administrative: - ID sponsor and manager - Classification and description of bank (e.g. single client) • Technical: - Location and size of bank, Technical classification and condition of bank wetlands, Location, classification, functions, and condition of potential debiting wetlands, Proposed methods to be used (e.g. enhancement etc) for the production of credits. Proposed methods and procedures to be used to determine the number of credits • Operational - Operational objectives, including delineation of bank's service area and specification of the functions and wetland class and habitat types to be produced for credits. - Proposed monitoring and contingency plans.
Development of Banking Instrument	• Interagency agreement to signed by sponsor and all agencies • Detail the physical, legal and administrative characteristics of the bank, and establish guidelines under which the bank will be developed, implemented and operated. • Required for all banks & is legally binding
Detailed Bank Planning	• Conduct detailed planning, including characterization of bank site
Review	• MBRT and regulatory authority review detailed plans and appropriateness of credits.
Finalise and sign Banking Instrument	• Signed by proponent, MBRT and regulatory authority.

IMPLEMENTATION	
Demonstrate Real Estate Interests and Proof of Financial Surety	• Type and value of financial surety • Identification of appropriate real estate interests (conservation easements, title deed transfers)
Regulatory Authority approves Availability of Credits	• Obtain guidance on concept • ID potential members of Mitigation Bank Review Team (MBRT)
Bank Sponsor Initiates Credit Production	• Through restoration, enhancement of creation of wetlands
Bank Sponsor Compiles Completion Report	• Report describes the “as built” conditions to the regulatory authority.
Review of Completion Report	• Involves site inspection by MBRT and Regulatory authority.

OPERATION	
Determination of Number of Credits	• By regulatory authority
Authorise Debiting of Credits for Compensation Purposes	• By regulatory authority
Operate and Maintain Bank	• Done in accordance with terms and conditions in the banking instrument • Includes period review of the bank's success
Monitor Bank Success	• Identify any deficiencies and if any is required that the credit balance is updated. • This is regulated by appropriate authority
Implement Corrective Action	• Undertaken by Bank Sponsor where deemed necessary by regulatory authority.

5. CONSIDERATION OF OTHER COMPENSATORY MECHANISMS

There are several mechanisms that have been supported by the US Army Corps and the U.S. Environmental Protection Agency (EPA) for permittees to meet the mitigation requirements of permits passed under various Acts. The primary mechanisms considered are project specific off-site mitigation, in-lieu fee mitigation and mitigation banking. The latter has been discussed in detail. The other two are defined and then compared with mitigation banking as required in the terms of reference in assessing which would be the most appropriate mechanism to apply.

A further option is described, that of the credit resale programme. This concept is a different model to mitigation banking as considered to date, rather than a new mechanism. It has been included to illustrate some of the thinking that has been adopted in an effort to maximise the returns on investment in mitigation measures.

5.1 Project Specific Mitigation

Project specific mitigation is defined as: “The restoration, creation, enhancement and in exceptional circumstances, preservation of wetlands undertaken by a permittee in order to compensate for wetland impacts resulting from a specific project”. The permittee performs the mitigation after the permit is issued and is ultimately responsible for implementation and success of the mitigation.

Each development project is handled on a case-by-case basis, with the Army Corps at the helm deciding the level of necessary mitigation at the time of the contract’s granting. It is then the responsibility of the developer to perform the necessary mitigation while development is occurring. The mitigation declared in the contract can be executed on-site or off-site depending on the decision of the Army Corps after evaluation of the area. Sometimes on-site mitigation can be as simple as removing an invasive species from the wetland area or implementing some form of erosion control of a canal or stream embankment in the area. Offsite mitigation may leave the developer responsible for creating a wetland near the development area or restoring degraded wetlands nearby.

5.2 In-Lieu Fee Mitigation

In-Lieu Fee Mitigation is where a permittee provides funds to an in-lieu fee sponsor, generally a public agency or non-profit organisation, instead of completing project-specific mitigation or purchasing credits. The sponsor is then responsible for planning and implementing the mitigation as agreed to by the regulatory authority.

5.3 The Credit Resale Program

This new form of mitigation banking is being implemented in North Carolina (Shabman and Scodari (2005)). It provides an alternative model for mitigation banking, as opposed to an alternative mechanism *per se*.

The program is characterised by three interrelated components:

1. First, funds to capitalize the program are provided to a government agency that has the mission of securing wetlands credits for permitted fills.
2. Second, that agency uses some of the funding for planning to predict the near-term wetlands credit needs of permittees by type and location.
3. Third, the mitigation agency is given the authority to act as both a purchaser and reseller of credits.

In that role, the agency uses a competitive bidding (Request for Proposal or RFP) process to build an inventory of quality-certified credits from private sector suppliers. The bidding process can encourage vigorous competition among wetlands credit providers on both quality and price. The winning bidders immediately begin credit production and are paid by the agency on a defined

schedule tied to credit development milestones, the posting of financial assurances, and the attainment of performance criteria. The RFP stipulates credit certification requirements, and the defined payment schedule eliminates credit demand uncertainty, for the winning bidders. The agency then resells the wetlands credits it has purchased to future fill permittees at prices that recover the full costs of securing the credits. As the credit inventory is depleted, new RFPs are issued. If properly designed and administered, Shabman and Scodari (2005) suggest that this approach can secure the supply, quality, and price advantages of a competitive market for wetlands credits (numerous credit sellers competing).

This model is promoted as a true market mechanism as opposed to traditional models of mitigation banking which are in effect regulatory in nature. The Credit Resale program represents an alternative to traditional Mitigation Banking mechanisms and highlights the evolving nature of the concept in the USA.

5.4 A Comparison of Mitigation Mechanisms for Wetlands

5.4.1 Mitigation Banking v In-Lieu Fee Mitigation

The new rule, proposed by the Army Corps and EPA in March of 2006, suggests the suspension of any future in-lieu programmes and that existing programmes may continue to sell credits as long as they re-constitute themselves as mitigation banks within five years of the final rule being published. There is therefore a preference for mitigation banks over the in-lieu mechanism for compensatory mitigation.

There are several important differences between in-lieu fee programs and mitigation banks which have resulted in the suggestion in the recent rule to phase them out:

- In-lieu fee programs are set up following approval which has resulted in a lag in mitigation being undertaken.
- Mitigation banks must achieve certain milestones, including site selection, plan approval, and financial assurances, before they can sell credits, and generally sell a majority of their credits only after the mitigation has been provided. In contrast, in-lieu fee programs generally provide mitigation only after collecting fees, and there is often a substantial time lag between permitted impacts and implementation of compensatory mitigation projects.
- In-lieu fee programs are also not generally required to provide the same financial assurances as mitigation banks which is an issue when they fail or require maintenance.

For the above and several reasons of less significance, there may be greater uncertainty associated with in-lieu fee programs regarding the final mitigation and its adequacy to compensate for lost functions and services.

5.4.2 Mitigation Banking v Project Specific Off-site Mitigation

Of the alternatives to Mitigation Banks, it is probably most important to conduct a comparison with Project-specific Offsite Mitigation, which is already being conducted in South Africa. Several of the issues discussed in the report, such as the determination of compensation ratios, apply equally to the two mitigation mechanisms, Mitigation Banks and Project-specific Offsite Mitigation. However, some of these issues have particular relevance to one or other mechanism, and this provides a useful means of comparing the two mechanisms and their particular application in South Africa (Table 5.1).

Table 5.1 A comparison in the South African context of Mitigation Banking and Project-specific Offsite Mitigation

THE SPECIFIC ISSUE	THE SITUATION IN RELATION TO MITIGATION BANKING (MB)	PROJECT-SPECIFIC OFFSITE MITIGATION (PSOM)	PREFERENCE
In-kind vs. out of-kind	Dependent on the bank providing the particular type that is being impacted upon.	In theory have more flexibility in locating an offset wetland of the same kind but would be dependent on developer locating the correct type	Depends on the situation
Size	Typically would result in few large consolidated areas, which are generally advantageous for maintaining biodiversity, especially if they are well located in a landscape context	Typically would result in many small, scattered areas, usually in a developed landscape, which offers high opportunities to the wetlands for buffering catchment water quality impacts and stormwater runoff.	Depends on the objective (biodiversity or catchment)
Location of offset in relation to the impact	Less flexibility for locating offset close to impact, and therefore likely to be more distant	Greater flexibility for locating offset close to impact	PSOM
Risk of failure as determined by timing of mitigation	Mitigation bank compensation occurs "up-front," prior to the impact. This assures the success of the mitigation before the wetland impact occurs. Mitigation bank credits are generally not available for sale until the bank has been deemed successful, usually one to two years after the mitigation work is complete.	Project specific offsite mitigation occurs after the impact or at best very shortly before the impact, which increases the risk of failure reduces the assurance of success.	MB
Legal and institutional mechanisms in place	The legal and institutional mechanisms are still uncertain in South Africa and no cases exist where MB has been applied in SA.	The legal and institutional mechanisms are known and already in place in South Africa some cases exist PSOM has been applied and tested in SA.	PSOM
Ease of conducting follow-up for monitoring and maintenance	Because consolidated in one area under a single owner it is much easier than for PSOM	Difficult because located in may widely dispersed areas involving several different landowners	MB
Economy of scale in terms of implementation	High	Low	MB
Responsibility	Responsibility lies with single owner, therefore easier to enforce compliance	Lies with multiple owners, therefore more difficult to enforce compliance	MB

The federal guidance lists several advantages of mitigation banking over individual mitigation projects, including the following (Federal Register, Vol. 60, No. 228, November 28, 1995):

- It may be more advantageous for maintaining the integrity of the aquatic ecosystem to consolidate compensatory mitigation into a single large parcel or contiguous parcels when ecologically appropriate.

- A mitigation bank can bring together financial resources, planning, and scientific expertise not practicable to many project-specific compensatory mitigation proposals.
- Use of mitigation banks may reduce permit processing times and provide more cost-effective compensatory mitigation opportunities.
- Compensatory mitigation is typically implemented and functioning in advance of project impacts, thereby reducing temporal losses of wetland function and uncertainty over whether mitigation will be successful in offsetting wetland losses.
- Consolidation of compensatory mitigation within a mitigation bank increases the efficiency of limited agency resources in the review and compliance monitoring of mitigation projects, and thus improves the reliability of efforts to restore, create or enhance wetlands for mitigation purposes.

The existence of mitigation banks can contribute toward attainment of the goal for no overall net loss of the nation's wetlands by providing opportunities to compensate for authorised impacts when mitigation might not otherwise be appropriate or practicable.

On balance, the Mitigation Bank option is clearly preferable to Project-specific Offsite Mitigation. Despite its disadvantages, Mitigation Banking is seen as a lower risk approach, and easier to monitor and enforce compliance. Thus, it appears to be a mechanism certainly worth pursuing in South Africa. Nevertheless, there is likely to be scope for the application of both mechanisms, provided that careful account is taken of the circumstances of the particular cases. Also, as highlighted earlier in the document, it is imperative that these mechanisms should not be used as an easy option for developers but that they should only be resorted to after a full assessment of impacts and a the unavoidability of the onsite impacts have been adequately demonstrated. Finally, because the legal and institutional mechanisms for implementation of mitigation banking have yet to be applied and tested, close monitoring of a pilot initiative would be essential.

6. STATUS AND TRENDS IN MITIGATION BANKING IN THE USA

Having established an understanding of the Mitigation Banking Process and its benefits over the other concepts applied in the USA, this section summarises trends in its application in that country. Despite being the preferred mechanism and enjoying support, WMB is still the subject of much criticism. Some of the key debates surrounding its use are also discussed here and provide the context for discussing the key benefits and limitations in the following sections.

Fleming (2004) summarises some of the key trends in the implementation of mitigation banking as a compensatory mechanism for wetland impacts noting that, use of banking as a form of compensatory mitigation has sharply risen in the past 10 years. According to Fleming (2004), a study by the Environmental Law Institute (ELI) conducted in 1993 found 46 banks across the country in various stages of functionality. As of December 2001, 219 banks had been approved and had begun operation. This constitutes a 376% increase in less than 10 years.

Despite the growing number of mitigation banks, a nationwide evaluation of compensatory wetland mitigation projects revealed that these projects are not always satisfying the goal of restoring and maintaining the quality and quantity of the U.S.A.'s wetlands (National Research Council, 2001, as cited by D' Angelo, 2005). U.S. federal agencies often permitted a net loss of wetlands (i.e. the mitigation required on paper was inadequate to compensate for what was lost), and furthermore, the required mitigation was often not fully completed or even failed completely (Robb, 2002). This perspective is summed up in the title of an article by Roberts (1993) "Wetlands trading is a losers game, say ecologists". Flemming (2004) expresses similar sentiments, stating that it is difficult to determine whether wetlands mitigation banking under current regulation is "a useful wetlands management tool or rather, an option that inevitably contributes to further incremental loss of habitats regionally and nationally in response to persistent demands for development permits". Several factors have been identified as potentially contributing to diminishing the performance of offsite mitigation and mitigation banking (e.g.

the ‘unavoidability’ of the impact is not always conclusively demonstrated before offsite mitigation is selected as a viable option, the functionality that is re-instated in the offset site may fall considerably short of that lost at the development site, etc.) Section 7 elaborates in much more detail on different factors that have been identified as potentially reducing the performance of off-site mitigation.

On the other hand, proponents of the mitigation banking concept feel that under proper regulation, mitigation banking has provided economic and environmental benefits. Hay and Philippi (2000) for example recently published a book “A case for wetland restoration”. Evaluations such as those of Wilson and Mitsch (1996) provide compensatory mitigation examples of good compliance with legal requirements and medium to high ecosystem success.

Both opponents and proponents are nonetheless agreed that if not properly planned and strictly monitored and managed, the concept is open to abuse and failure in mitigating authorised impacts. Based on an evaluation of the performance of compensatory mitigation sites in Indiana, Robb (2002) supported the conclusion of King and Bohlen (1994) that the poor performance of compensatory mitigation projects is more a function of poorly motivated applicants and agencies’ failure to enforce mitigation requirements than the status of restoration science. The high number of incomplete and undersized mitigation sites reported by Robb (2002) suggests strongly that follow up and enforcement were inadequate, which allows applicants to cut corners rather than implement high quality restoration (King and Bohlen, 1994). In response to this need, federal guidelines were produced in 1995 to guide the process of initiating, planning, establishing, operation and monitoring of mitigation banks. Ten years on from the publishing of the guidelines and cases of failure still occur. Criticism is levelled at the guidelines and wetland definitions are considered too broad. There are a range of more specific issues underlying the considered failure of the concept in the USA (see Section 9).

Fleming (2004) recognizes that the concept is an evolving process. The regulatory authorities are continually responding to the lessons learned and gaps in the regulatory framework. This is evidenced in the publication recent publication of “Compensatory Mitigation for Losses of Aquatic Resources; Proposed Rule” in March of this year (Department of Defence, 2006). The proposed regulations are intended “*to establish performance standards and criteria for the use of permittee-responsible compensatory mitigation and mitigation banks, and to improve the quality and success of compensatory mitigation projects for activities authorized by Department of the Army permits. The proposed regulations are also intended to account for regional variations in aquatic resource types, functions, and values, and apply equivalent standards to each type of compensatory mitigation to the maximum extent practicable.*” These comprehensive amendments seek to tighten up on the application of mitigation banking.

The growing demand in the USA is likely to increase given the recent policy shift – to increase the wetland area in the USA. Belief that mitigation banking has merit and should be developed further is highlighted by the proposed amendments to the regulatory framework under the new ‘rule’ as implementation of these amendments will require added resources and effort. Something that would unlikely not have been committed to if the mechanism is not able to deliver benefits and achieve the national vision for wetlands.

In additional support of the concept, the 2006 “rule” cements mitigation as the preferred mechanism for the regulation of compensatory mitigation for wetlands by requiring that in-lieu fee mitigation be phased out.

7. COMPENSATORY MITIGATION FOR WETLANDS IN SOUTH AFRICA

South Africa is at a point where various forms of compensation are being applied to offset wetland loss due to the impact of development activities. Several examples are briefly summarized below, followed by a discussion regarding the benefits and limitations of the mitigation measures that have been adopted in the examples provided.

7.1 Spring Grove Dam in the Upper Mooi-River Catchment

DWAF have been responsible for planning the rehabilitation of approximately 338 ha of wetland in the Upper Mooi River Catchment in KwaZulu-Natal to offset the loss of wetlands to be inundated by the proposed Spring Grove Dam. The dam will provide storage for the Mooi-Mgeni Transfer Scheme. These mitigation measures were planned in response to the identification of the loss of wetlands as a significant issue in the feasibility level study conducted for the project. The planning process has the following outputs:

- Identification of rehabilitation sites through analysis of inventory data, aerial photography and landowner consultation.
- Assessment of rehabilitation sites.
- Planning of rehabilitation measures.
- Development of rehabilitation plans.
- Development of a monitoring and maintenance programme.

Costs for implementing and monitoring the rehabilitation have been included in the project budget. The rehabilitation will be undertaken as a condition of the Environmental Authorisation Process (EIA).

7.2 Coal Mining in the Upper Olifants Catchment

The Upper Olifants River Catchment (UORC) in Mpumalanga is rich in both wetlands and coal reserves, many of which underlie these wetlands system. Palmer *et al.* (2002) consider mining as the most significant threat to the wetland systems in the UORC, particularly surface mining which leads to the irreversible destruction of wetlands. Wetlands are targeted for surface mining because they are situated in low-lying areas where the distance to the coal is less than other situations in the landscape, and where the costs of mining are consequently lower.

Pressure to mine these reserves has resulted in significant tension between public and private organisations and government departments concerned with the conservation of wetland resources and those mandated with developing mineral resources. The situation has led to the various initiatives that seek to offset the impact to wetlands to meet requirements of the water use license required in terms of the National Water Act, No 36 Of 1998 and environmental authorisation in terms of the applicable mining legislation.

The AngloCoal Off-Site Wetland Mitigation Project is a good example of an attempt to implement effective compensation for impacts to wetlands from surface mining in the UORC. Discussions during the EIA involved various stakeholders including Department of Water Affairs and Forestry (DWAF) and the Mpumalanga Tourism and Parks Agency (MTPA), and led to the a solution which was based upon the following:

- The boundaries of the initial mining area were modified to reduce the impact on the wetlands in the Steenkoolspruit in the Upper Olifants River Catchment;
- A commitment was made to rehabilitate as much of the disturbed on-site wetland as practically possible after mining;
- A further commitment was made to rehabilitate off-site degraded wetland areas in the Upper Olifants River Catchment.

These mitigation measures formed part of the approved Environmental Management Programme Report (EMPR). Working with the Mondi Wetlands Project, Working for Wetlands (WfW),

DWAF, MTPA and expert Wetland Consultants appropriate degraded wetland sites in the Steenkoolspruit system were identified, evaluated and selected for the mitigation work.

AngloCoal formed a partnership with WfW to implement the offsite mitigation with WfW undertaking the physical off-site rehabilitation using their proven standards and procedures, whilst Anglo Coal provided the funding.

The 'Isibonelo Project' has gained recognition in the form of NEDBANK GREEN AWARD. The award was granted for the extensive collaboration that took place between the applicant and a wide range of role players. The award also recognised the resulting benefits to the rehabilitated wetlands and socio-economic environment arising from the work being implemented by WfW. As a poverty alleviation works programme, its operation includes capacity building and employment of under privileged communities of which a proportion includes people suffering from HIV Aids and women. A limitation of the project is that the mitigation sites are located on privately owned properties. While AngloCoal obtained authorisation to undertake the mitigation on these properties, the agreement does not prevent the current or future landowner from engaging in land-use which may in/directly impact the rehabilitated sites. This remains a concern of Anglocoal which they wish to address in Phase 2 of the mitigation (Coombes, *pers com*).

Various other coal mining companies face similar challenges in developing their mining rights in the catchment where they intersect wetlands, and are in the process of investigating offset options.

7.3 Road Construction in Durban

This represents an example of where off-site mitigation for the impact of road construction has been implemented. The project involved wetland rehabilitation/creation to mitigate loss of wetland that provided habitat for a locally occurring species of frog. The rehabilitation took place on the property of the University of KwaZulu-Natal with input from wetland ecologists at the University. The benefit of this arrangement is that the rehabilitation effort was protected in the long term due to its location on the University's property.

7.4 Braamhoek Pump Storage Scheme

This is one of the most hotly contested EIA's in the country to date in terms of the impact to wetlands. The impacted wetland system was considered irreplaceable for various reasons and the initial approval to proceed was overturned based on appeals by various concerned wetland ecologists and conservation groups. This decision was itself reversed following a subsequent appeal by the developer which included further investigations into the impact on the receiving wetlands. Permission to proceed with the project was contingent on various mitigation measures identified in the additional investigations, being implemented. Apart from basic mitigation measures such as the need to maintain the natural flow regime to the downstream wetland, the primary mitigation included as a condition of the Record of Decision was that the applicant purchased the entire property on which the affected system occurred, and that they manage it as 'Wetland Park'. The authorities also required that:

- Management is undertaken by the applicant in close cooperation with the relevant provincial departments.
- The applicant rehabilitates wetlands on the 'wetland park' to address sheet and gully erosion, and that this also be undertaken with close cooperation with the relevant provincial department.

Management measures included a monitoring programme to review compliance with the conditions and requirements of the EMP, and to identify any unforeseen impacts to the wetlands that may arise over time.

7.5 Summary of South Africa Situation

A brief analysis of the four cases presented above shows a lack of consistency in the compensatory measures applied and accepted by the regulatory authorities in authorising the projects considered. This issue extends to the type of compensation adopted, the level of detail applied in the associated studies and therefore the scientific basis for setting targets, as well as the roles and responsibilities in each instance. As a result, many of the fundamental issues and criticisms of compensatory mitigation measures that have been debated in the USA over the past 15 years and which are discussed in the following sections are also apparent in our local cases. These issues are discussed briefly below:

In the case of the Spring Grove project the following issues are relevant:

- The delineation and assessment of the impacted wetlands was undertaken at a very coarse level and did not include a functional assessment. The same issue applies to the mitigation sites with final selection being based on land-owner agreement rather than scientific justification.
- Options to secure preliminary landowner agreement for mitigation to take place on their property, and more importantly to secure it in the long term took place during the planning phase. However, no legally binding agreements were secured. Certain properties have subsequently changed hands and there is no guarantee that the new owners will be willing to agree to the planned mitigation.
- The ratios applied in establishing the target mitigation area were recommended by the consultant and lacked thorough scientific research.
- A significant proportion of the rehabilitation is planned to take place in the adjoining catchment. This goes against the principle of mitigating as close to the impact site and within the affected catchment.

In the case of the Isibonelo Project, consultation with stakeholders involved in this project has raised similar concerns regarding certain of these initiatives including:

- Concern that the concept is being applied to wetlands in the catchment that should not be impacted because they are considered to be in good condition and/or irreplaceable. This is an issue that requires clear policy and substantial information about wetland type within a catchment or biological region in order for it to be adequately addressed.
- Certain projects are being questioned on the basis of the fact that mitigation has been undertaken in different wetland types (out of kind mitigation), and that there is a subsequent loss of a certain function or habitat type within the catchment.

The condition that the property on which the unaffected section of the wetland affected by the Braamhoek Pump Storage Scheme be purchased and managed as a wetland park, effectively resulted in a net loss of wetland. It is questionable whether such compensation meets the requirements sections of the National Environmental Management Act, No 107 of 1998 and the National Water Act, No 36 of 1998 which govern the mitigation of unavoidable impacts to the environment.

It is not a requirement or the aim of this project to analyse the motivation of the developers or the effectiveness of the authorities in applying relevant legislation to these projects. What these examples show is that;

- there is increasing consideration of compensatory mitigation for impacts to wetlands in order to address the challenges of development. This should be construed as a positive trend;
- there is however no set policy, approach or consistency in the mechanisms being applied to compensatory mitigation of wetland impacts, and consequently;
- there are questions in each case regarding the effectiveness or suitability of the mitigation measures adopted in achieving effective and sustainable compensation for impacts to wetland resources.

While the current situation raises concerns there are positives, no more so than the sincere commitment and extensive collaboration shown by the private sector, government and parastatals in certain cases in an effort to identify innovative ways to address conflicting interests. The Isibonelo Project is a good example of the benefits that can result from such collaboration and commitment.

In addition to the examples presented which focus on wetlands, the concept of offsets³ in general is gaining popularity in South Africa to the extent that the Western Cape Department of Environmental Affairs and Development Planning (DEADP, 2006) has developed a policy to guide the application of offsets in the EIA process in that province. The need for such a policy was highlighted by several cases in the Western Cape where offsets formed a condition of the authorisation for certain projects. The basis for the offsets (scientific or otherwise) and therefore the effectiveness of the offset in effectively mitigating the unavoidable impact were however considered questionable and challenged in the EIA appeal process.

From the above discussion, it is apparent that there is a growing demand and place for mechanisms such as mitigation banking that offset unavoidable environmental impacts in the South African development context. For such mechanisms to be successfully implemented they need to be:

- Appropriate to the local context (both the local natural environment and legal/policy framework),
- Applied within specific policy/guidelines that are developed to govern their implementation, and which thereby ensure that these mechanisms are not abused.

The question is whether mitigation banking is appropriate, and the most suitable mechanism to address unavoidable impacts to wetlands in South Africa, a question which this report seeks to answer. In order to do so, a better understanding is required of the key issues surrounding its application and how readily these issues are likely to be able to be addressed in South Africa given the particular circumstances in this country. The report first investigates whether other countries have considered and adopted mitigation banking, and if not why.

8. COMPENSATORY MITIGATION FOR WETLANDS IN OTHER COUNTRIES

This study intends to use lessons from the USA to establish whether it is worth testing mitigation banking in this country, and if so what model would be appropriate given local conditions. It is however possible other countries have already analysed the USA example and either discarded the concept based on their findings, or adopted it in a different and more effective model to that described in Section 4. Such findings will therefore influence discussion regarding the appropriateness of the concept as well as the various benefits and limitations of the concept and alternative means for addressing them.

A literature review was undertaken for a range of countries including Canada, Australia and Uganda. These countries were either selected because they have similar legislation to South Africa's (Australian Water is Law is similar to South Africa's) or strong wetland policy such as Uganda. Uganda was also selected because it is a developing African country dealing with similar issues to South Africa. Canada was also selected as an example of a developed country and because of its close proximity to the USA.

³ Biodiversity offset - conservation actions intended to compensate for the residual, unavoidable harm to biodiversity caused by development projects, so as to ensure no net loss of biodiversity. Before developers contemplate offsets, they should have first sought to avoid and minimise harm to biodiversity (ten Kate, K, Bishop, J. and Bayon, R. 2004).

8.1 Canada

Canada has a Federal Policy on Wetland Conservation (1991), and Cox and Grose (2000) compiled a framework for applying wetland conservation in Canada.

While the Federal policy includes the idea of No-Net Loss, the North American Wetlands Conservation Council (Canada) NAWCC have recommended that “mitigation banking, as currently conceived, should not become part of the wetland mitigation process in Canada as historically, the U.S. experience has not been very positive”.

While the NAWCC recognise that mitigation banking allows for some flexibility and compensation dollars to go to priority sites, it feels that it can also encourage a "commodity" approach to conservation wherein wetlands are traded for cash. The NWACC also feel that mitigation banking places emphasis on compensation rather than conservation, and allows the, avoid and mitigate/minimize alternatives in the "No Net Loss" process to be circumvented.

Canada therefore adopts a straight off-site mitigation approach to meeting the aims of their federal policy. Certain provinces such as Alberta (2005) have developed their own wetland restoration/compensation guidelines. The process in Alberta, as summarized in Figure 8.1 includes many of the principles included in setting up a mitigation bank such as the need to adopt a catchment (watershed) approach, apply mitigation ratios and for the applicant to fund the rehabilitation measures

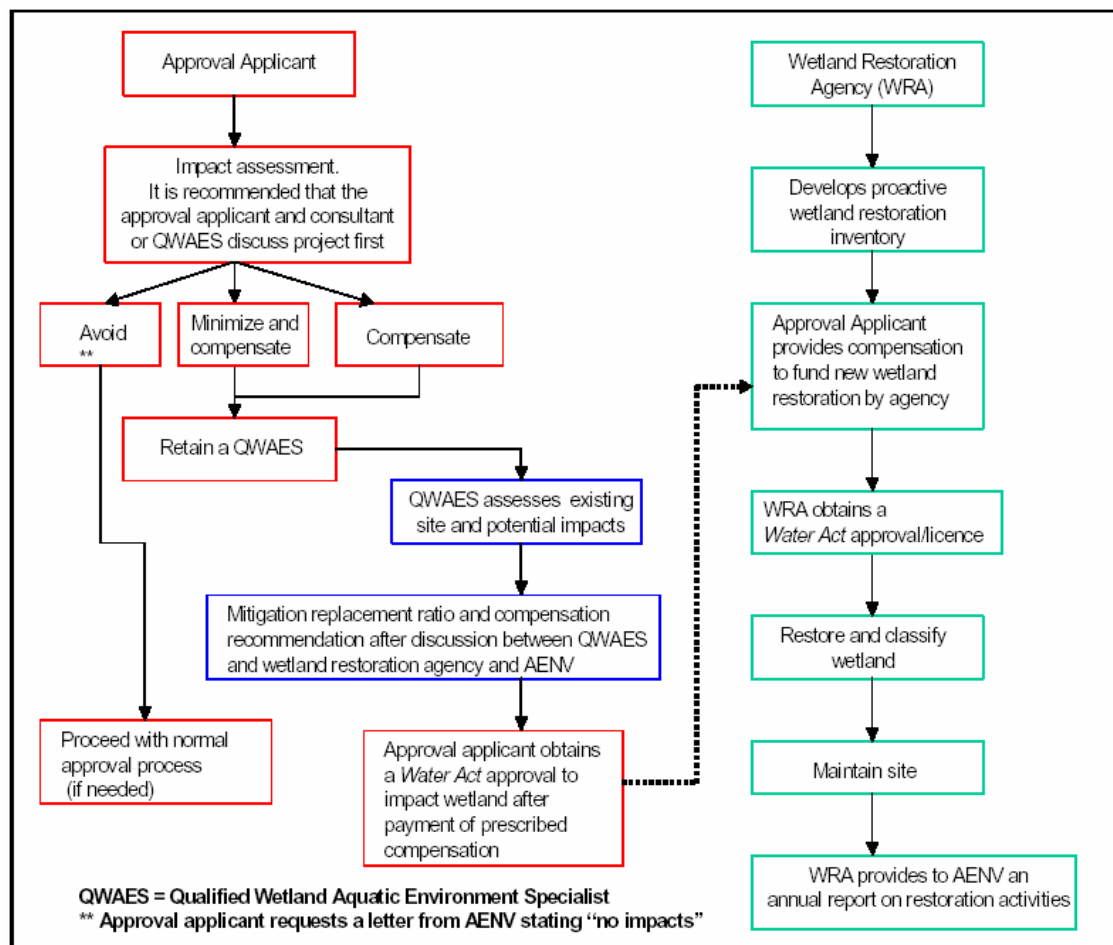


Figure 8.1 Summary of wetland off-site mitigation system applied in Alberta Canada

The model applied in Alberta sees responsibility for identifying rehabilitation sites (inventory) and costing rehabilitation lying with a wetland restoration agency, much like the WfW programme in South Africa. The agency would also be responsible for monitoring the sites, addressing any maintenance issues, and for providing annual audits to the Alberta Environmental Evaluation Branch (regulatory authority).

The Canadian decision not to adopt mitigation banking is an important one to consider given their close proximity to the USA experience, and the fact that are a developed country likely to have more capacity to implement mitigation banking than developing nations. It would appear from the limited review and information available that one of the key reasons for Canada not adopting the mechanism is that they feel it “results in the: avoid and mitigate/ minimize alternatives in the "No Net Loss" process to be circumvented”.

This issue is particularly relevant in South Africa where pressure to develop and generate socio-economic benefits in the short term is a significant, and EIA decisions are often made in a vacuum of information necessary to consider cumulative impacts at a regional or catchment scale. This issue highlights the need for a sound level of information to be available at a catchment level and for the existence of thresholds of acceptable loss, and or priority systems to have been identified in establishing a bank.

The Alberta model for implementing off-site mitigation is also interesting as it includes a Wetland Restoration Agency, much like Working for Wetlands in South Africa that establishes an inventory and then rehabilitates. Unlike WfW which is funded by the state as a poverty relief programme, the equivalent agency in Alberta rehabilitates as money becomes available from applicants who have approval to impact on condition they mitigate. The credits are therefore not established in advance, as is the case with mitigation banking.

8.2 Australia

The commonwealth government of Australia published the Wetlands Policy of the Commonwealth Government of Australia in 1997 (Biodiversity Group of Environment Australia, 2007).

According to the Department of Environment and Conservation in New South Wales (DECNWS) (2006), Australia is facing unprecedented challenges in conserving its biological wealth while encouraging sustainable social and economic development. The state of New South Wales established a wetland policy in 1996, in which principle 6 requires that “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”. The policy does not include specific guidance as to how such compensation should be implemented and consequently offsets are usually negotiated on a case-by-case basis leading to uncertainty and delay. This situation mirrors that currently faced in South Africa.

As is the aim of the NGBP, the DECNWS is proposing to establish a biodiversity offsets and banking scheme to provide a systematic and consistent method for offsets in order to address the cumulative loss of habitat associated with new development and to complement existing initiatives for biodiversity conservation.

As a basis to informing the development of an appropriate “biodiversity offsets and banking scheme” the DECNWS (2006):

- describes the tools already used in NSW
- describes other approaches used in Australia and the rest of the world,

including background information on biodiversity offsets and banking schemes and ways in which these schemes have developed.

Mitigation banking for wetlands does not feature as one of the concepts currently being applied in Australia, but the DECNWS does consider WMB as one of the options to be explored in the development of their proposed offsets and banking scheme. As with this document, the New South Wales review acknowledges the shortcomings of mitigation banking for wetlands, but concludes that it has merit and is worth considering as they move forward with establishing a consistent approach to offsets in NSW. In a review of their existing policy the DECNWS proposes adopting many of the key aspects of USA policy and practice, such as the principle of No-Net-Loss, using the catchment as the basis for wetland management and designing offsets.

In a national review which included recommendations relating to incentive measures for conserving freshwater ecosystems, Whitten. *et al.* (2002) recommended that “further investigations are warranted into the potential use of wetland mitigation banking schemes in Australia. State and Territory Governments, possibly with Commonwealth Government involvement should examine the pros and cons of such schemes, and consider pursuing trials”.

8.3 Uganda

The government of Uganda has prepared a Wetland Sector Strategic Plan (WSSP) for the period 2001-2010. The WSSP aims to provide a clear sense of purpose and direction and a supporting action framework for all those who will be involved in wetland management and conservation over the next ten years (Mafabi, *undated*).

The WSSP forms a single consolidated planning, budgeting, implementation, monitoring and accounting framework for all wetland activities carried out in Uganda. Uganda has strong wetland specific policy, especially when compared with other African countries, which includes many important principles such as recognition of the irreplaceability of certain wetlands types. The country is in the process of developing the tools and instruments to implement this policy and as yet have reached a stage of considering mitigation banking as one of these.

Of the various countries considered, Australia would seem to be at a very similar point in its consideration of offsets and financial mechanisms for conserving biodiversity on private land. One of the key aspects of the Australian documents reviewed was that they all considered a range of alternative mechanisms, financial and otherwise and aimed to compare the pros and cons of each in deciding the most appropriate mechanism for their circumstances. In each case mitigation banking was considered to be worthy of consideration. The reports also all concluded that a mix of different mechanisms was likely to be required in order to address different development scenarios and natural systems.

Canada on the other hand have considered mitigation banking and decided not to adopt it in their framework for compensatory mechanisms. If mitigation banking is to be piloted in South Africa the model needs to be designed to avoid the key issue for their decision i.e. mitigation banking resulting in the loss of wetland resources due to substandard rehabilitation caused by the potential to generate profit by the banks, combined with inadequate regulation by authorities.

9. STRENGTHS AND WEAKNESSES OF THE CONCEPT

The issues are categorized in terms of those that are technical in nature, and those that are concerned with the legal and institutional framework within which mitigation banking is employed.

In each case, the issue as it pertains to the USA is explained. It is then discussed in the South African context, examining how it may be relevant given the nature of our wetlands, the level of science, tools, institutional arrangements, legislative framework and capacity in our country. Suggestions are also made as to how negative issues may be overcome in applying mitigation banking to the conservation of wetlands in South Africa.

The section concludes with a summary of the technical, institutional and legal requirements necessary to implement mitigation banking. These requirements are considered against the South African situation to highlight where our situation is either enabling or limiting and therefore requires development.

9.1 Technical Issues

The aim of mitigation banking is to ensure that impacts to wetlands are effectively mitigated. The dynamic nature and variation inherent in these systems makes this a challenging task. It is the considered failure of the concept to achieve objectives, such as retaining wetland function, which is the main thrust of the argument against mitigation banking in the USA. This and other issues are discussed below.

9.1.1 Wetland Definition and Guidelines for Delineation

The issue as it stands in the USA

In 1989, the Army Corps of Engineers (with input from other agencies) published the *Federal Manual for Identifying and Delineating Jurisdictional Wetlands (Wetlands Manual)*, a significant document outlining the scientific methods for identifying and classifying wetlands. It was the intent of the Corps to provide a more specific and technical process to be used in defining wetlands under federal jurisdiction. The Corps used a multi-parameter approach to define wetlands areas including three main characteristics: hydrology, soil, and vegetation. While the *Wetlands Manual* provides a highly technical and scientific method for defining wetlands, the legal definition has been put under great scrutiny. The definition of a wetland varies in the eyes of the law depending on the interpretation by the Corps and EPA, the Congress and the Supreme Court. In 2001 a case involving wetland regulations was presented to the Supreme Court. The Solid Waste Agency of Northern Cook County (SWANCC) vs. Army Corps of Engineers has proven to be the most controversial case to emerge with regards to wetland definition. The Supreme Court held that the Corps had exceeded its regulatory authority when denying a permit for development to a Northern Illinois County on the basis of the area being a functional habitat for migratory birds. This raised serious questions about the Corps' ability and freedom to interpret the rules and jurisdiction of regulation under federal law. Many volumes of legal journals and environmental policy analyses have been dedicated to study this ruling.

The issue in a South African context

The standard definition of a wetland applied in South Africa, is that contained within the National Water Act. DWAF also published guidelines for the delineation of wetlands in 2005. There are no known cases of the definition or boundary of a wetland delineated according to the DWAF guidelines being challenged in court. Thus, as yet their legal defensibility is not known, but is probably reasonable at least. In addition, regulatory agencies request that wetlands be delineated to inform decisions regarding development proposals. As an example, it is becoming

standard practice in KwaZulu-Natal for DWAF and the provincial conservation agency (Ezemvelo KZN Wildlife) to require delineation of wetlands either to inform the EIA process and or the associated Environmental Management Plan.

9.1.2 In-Kind vs Out Of-Kind & On-Site vs Off-Site

The issue as it stands in the USA

Initially compensatory mitigation projects in the USA were undertaken mainly on an individual site-by-site basis. Based on this approach, it is preferable to mitigate within the site rather than in another site. Similarly, it is preferable to mitigate with the same type of wetland that is being impacted upon rather than with another type of wetland. These principles ensure that wetland function is retained in the impacted area.

Over time, however, there has been a shift from a primary focus on individual sites to maintaining the functionality of landscapes and catchments. Along with this shift has been a corresponding move from site selection and design being driven very strongly by a preference for “on-site” and “in-kind” mitigation to landscape-driven site selection and design. The new approach to compensation is doing what makes the most ecological sense and has the greatest potential to replace or improve on what is being lost in a landscape context (if a watershed plan already exists in the area of project development, considering that plan in site selection should be a priority”).

The issue in a South African context

Wetland mitigation efforts in South Africa have to date generally been undertaken off-site. This is largely due to the nature of the impacts which have prevented on-site mitigation – examples being the Spring Grove Dam and Braamhoek cases where the impact involved inundation of onsite wetlands. Understanding amongst practitioners on the limited examples undertaken in this country has been that ‘In-kind’ replacement was best practice and at least in the cases where the author has been involved, this was the aim of rehabilitation efforts.

Looking forward, an area of wetland may be lost in a portion of the catchment of a relatively low priority. The benefits that would accrue to the catchment may be much greater if the mitigated area was located in a much higher priority portion of the catchment than where the loss is taking place (i.e. off-site mitigation would be more preferable in this case). Similarly, if the wetland type being lost was of a type with a relatively low conservation importance (e.g. *Typha capensis* marsh in the Western Cape where there are significant areas of this wetland type) then ecological benefits would be greater if the another wetland type of a higher priority in the bioregion was restored for compensatory mitigation (i.e. out of kind mitigation would be more preferable in this case).

It is important to emphasise however, that the sorts of judgements made above require adequate data on the importance and cumulative impacts on the different wetland types and of the issues and needs of different portions of the catchment. In the absence of these data in-kind option provides a useful rule of thumb to follow. Presently in South Africa, we lack detailed inventories and catchment management strategies that would assist in prioritising wetland types and areas within a catchment. These would be important requirements for establishing a mitigation bank.

Choosing between the most appropriate mix of on-site and off-site mitigation measures

Having established that the impacts associated with a particular development are unavoidable, an important question to then address is the extent to which the impacts should be mitigated by on-site measures, off-site measures or a combination of the two (i.e. what is the most appropriate combination of mitigation measures?). The answer will depend, of course, on the particular circumstances at the site. The first key factor to examine is the possibility for on-site mitigation.

On-site mitigation is preferable to off-site mitigation, based on the principle that it is better to mitigate close to the location of impact than far from this location.

Even so, it is recognized that there may not be any possibility for on-site mitigation, or very limited possibility. However, if the possibility for onsite mitigation is high then most mitigation resources should be focused on onsite work rather than offsite. Offsite mitigation could potentially supplement the onsite efforts where they would not fully compensate for the impact. If, however, the possibility for onsite mitigation is low then the mitigation resources should be focused on offsite options. Also of consideration are the types of impacts being mitigated? On-site measures are generally most effective for mitigating the potential impact of pollutants leaching from the site to downstream catchment areas. Off-site mitigation, on the other hand, is generally most effective for mitigating the loss of fauna and flora on the site.

In the case of infrastructural developments on a wetland site, as well as the case of dams deeply flooding a wetland site, no possibilities exist for onsite mitigation because the intention is for these uses to remain on the site. In contrast, mining as a land-use has a short to medium time span, which means that potential exists to carry out on-site mitigation. The problem, of course, is that mining generally results in drastic changes to the landscape, and thus the resources required to implement on-site mitigation are potentially significant, and in terms of re-establishing the native fauna and flora largely impossible. But failure to adequately mitigate on-site, has the potential to result in important environmental impacts, particularly in terms of leaching of solutes from the site, which may compromise water quality of downstream catchment areas for a considerable time after the mining has ceased. In the case of mining, if inadequate on-site mitigation is implemented then the secondary impacts that result may outweigh the benefits from off-site mitigation. Thus, a minimum standard of on-site mitigation must be met within the chosen mitigation mix (additional off-site mitigation should not be seen as a substitute for inadequate on-site mitigation).

Regulation of effective on-site mitigation requires that the mechanisms which govern these activities and which are legally binding on the developer i.e. EMPs in the case of the EIA regulations and EMPRs in the case of mining authorisations, include comprehensive and realistic rehabilitation measures that are reviewed by experts before approval. The EMPR needs to clearly identify which of the impacts identified in the EIA process will be mitigated through onsite rehabilitation measures and which of the impacts can not be addressed via on-site efforts. Effective offsite mitigation then needs to be defined in the EMPR to offset the outstanding impacts.

9.1.3 Size of Mitigation Banks

The issue as it is articulated in the USA

This issue relates closely to the previous point. Compensatory mitigation initially took place in several, small disparate wetland areas. However, federal policy has encouraged mitigation to be undertaken in fewer and increasingly large and more consolidated wetland areas. This has several advantages.

- It is more cost effective to implement
- It is much more cost effective to monitor.
- The ecological integrity of the mitigation areas are more readily maintained, particularly where the overall landscape has been highly transformed.

The consolidated approach does, however, have some disadvantages. Large, consolidated mitigation sites are generally located in parts of the landscape where there is not a great deal of development taking place, and where land is therefore usually cheaper. While this is advantageous for maintaining the ecological integrity of the mitigation site because of the fewer developments impinging on the wetland and its catchment, these wetlands tend to be afforded much less opportunity for carrying out buffering and assimilative functions (e.g. assimilating

pollutants and attenuating storm-flows) than if they were present as several smaller areas spread through the developed portion of the landscape. This applies particularly in urban areas and in areas intensively used for agriculture or mining, where impact and opportunity for wetlands to handle the larger volumes of stormflow and pollution generated in such areas is greater. In the USA, because banks simply have to be in the same county or watershed, sponsors may choose an area that provides a wide-ranging marketplace, but serves very little purpose in improving the areas of highest development

Furthermore, small, isolated wetlands have their place in maintaining ecological integrity at a landscape level. The assumption that species found in small wetlands are also found in large wetlands is incorrect. There are unique isolated wetland systems that are dry for crucial points of the reproductive cycle for many organisms. These “short-hydroperiod wetlands appear to be important for maintaining populations of wetland-associated species found only in these systems.”

The issue in a South African context

As in the USA, the intensity with which the landscape is used varies considerably from one location to the next. Furthermore, the general size of wetlands varies considerably according to the particular landscape. For example, in some bioregions, wetlands are typically very small, with most wetlands seldom exceeding even 1 ha (Dely *et al.*, 1999) whereas in other bioregions wetlands are typically much larger. Thus, it would be inappropriate to restrict mitigation banks to large consolidated wetland areas only, and each case needs to be taken on its own particular circumstance/merits. Nevertheless, it would probably be a useful principle to encourage the consolidation of wetlands into larger areas in as far as the particular circumstances in the landscape will allow.

Finally it should be noted that a single wetland bank including a relatively large spatial area of wetland, could consist of a complex of smaller wetlands scattered in the landscape but owned and administered by a single entity.

9.1.4 Geographic Service Area

The issue as it is articulated in the USA

The *Federal Guidance* defines the geographic service area of a bank as “the designated area (e.g. watershed, county) wherein a bank can reasonably be expected to provide appropriate compensation for impacts to wetlands and/or other aquatic resources.” In other words, the geographic service area defines the marketplace in which the bank may sell its credits. Service areas are delineated by watershed or by county. A watershed is any area that drains into a common stream, river, lake or other body of water. Watersheds are either delineated by state watershed boundaries or by the United States Geological Survey (USGS) Hydrologic Unit Map⁴.

According to Omernik (2003), there is little understanding even amongst managers and scientists regarding the difference between watersheds and hydrologic units (HUs), with the common understanding being that hydrologic units are synonymous with watersheds. According to Omernik (2003) whereas true topographic watersheds are areas within which apparent surface water drains to a particular point, generally only 45 percent of all hydrologic units, regardless of their hierarchical level, meet this definition. In the case of hydrologic units, the area contributing to the downstream point in many hydrologic units extends far beyond the unit boundaries. The HU framework is hierarchical in which units of roughly similar size have been mapped at several

⁴ The United States is divided and sub-divided into successively smaller hydrologic units which are classified into four levels: regions, sub-regions, accounting units, and cataloguing units. Each hydrologic unit is identified by a unique hydrologic unit code (HUC) consisting of two eight digits based on the four levels of classification in the hydrologic unit system

levels. For the conterminous United States 21 units have been defined at the first level, 222 have been mapped at the second level, 352 at the third level, and 2,150 at the fourth level. Because hydrologic units and watersheds seldom correspond to areas containing similar mosaics of geographic phenomena associated with differences in water quality and quantity, the logic of using these units for most "water-resource and related land-resource planning" is questionable (Omernik and Bailey, 1997; Griffith et al., 1999) in Omernik (2003).

The geographic service area of banks shows an interesting tendency as well. Even though the Federal Guidance explicitly suggests that the service areas for banks should be based on the "Hydrologic Unit map of the United States," only 11% of banks currently follow this principle. (Environmental Law Institute, *The Banks and Fees: The Status of Offsite Wetland Mitigation in the United States*. September 2002. p. 47. in Fleming 2004).

The following graph shows the distribution of service areas for banks in the U.S. as of 2001.

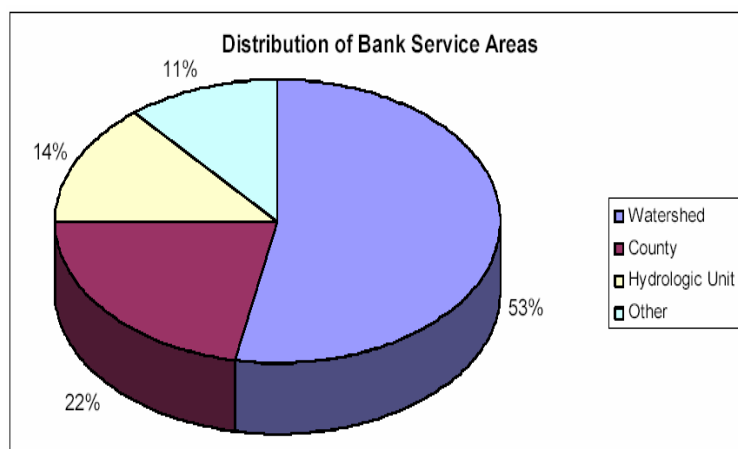


Figure 9.1 Distribution of Bank Service areas (Environmental Law Institute Study 2001)

Clearly the watershed approach is the most widely used method for outlining bank service areas. The service area is set forth in the banking instrument by the Corps Mitigation Banking Review Team (MBRT) upon initial setup of the bank. States and local entities may also be involved in the process of selecting bank service areas, which is why watershed and county delineations are widely used rather than the U.S. Hydrologic Unit Map. The geographic service areas vary widely from state to state. In Chicago banks define the service area solely based on watersheds, keeping them small and allowing for impacts only very near the mitigation bank. Wisconsin, by contrast, has a bank (Wisconsin Waterfowl Association Banking Instrument) that allows the whole state to be used as a service area. Similarly the Mile High Wetland Bank in Colorado has a service area that spans 8 counties and 10,000 square miles. The large service areas are highly desirable for the bank sponsor, creating a larger market to sell their credits, but can have negative ecological consequences.

"Watershed/catchment planning provides understanding to which watersheds are most threatened and most degraded. In effect, it paves the way for "smart mitigation" because it ensures mitigation placement where the most ecological benefit to watersheds may be reaped. The Ecosystem Enhancement Programme (EEP) uses a two-step watershed planning process involving

- 1) A screening of the major river basins to identify targeted local watersheds (TLW); followed by
- 2) A more detailed assessment of selected TLWs." The TLWs are identified through a GIS methodology.

The process accounts for a variety of watershed characteristics including water quality status, anticipated wetland and stream impacts, available valuable natural resources, potential for

mitigation adjacent to conservation efforts, opportunities for partnerships with other organisations, and percentage of cleared land” (Berry-Endler, 2005). Watershed planning is an expensive and time consuming undertaking as it involves assessing watersheds (at some local level) individually, developing specific needs, and then including the acquired information into final mitigation decisions. Furthermore, the watershed planning criterion requires the implementation of watershed planning at the state or regional level, including the development of individual watershed assessments followed by watershed plans and finally concluding with making decision regarding wetland mitigation using the watershed plans.

The issue in a South African context

Apart from the strong ecological motivation, in South Africa the catchment-based approach would make sense as the country moves towards catchment management through the development and implementation of Catchment Management Strategies (CMSs) developed by the Catchment Management Agencies (CMAs) in the various Water Management Areas (WMA's).

The limitation facing implementation of this concept is that CMAs are only likely to be constituted and fully operational in the next 10-20 years. The question facing the development of a mitigation bank based on this approach is who funds the necessary information collection and analysis at the various scales in the interim. Options include, DWAF (DWAF Regional Offices are the *de facto* CMAs until the new organisations are fully operational, but generally do not have the capacity to undertake this type of activity), sector players who require mitigation options to grow the sector, and Conservation Authorities who are responsible for the management of biodiversity at a provincial level. Alternatively, because the development of a wetland inventory and associated prioritisation process and management plan would serve the mandates and needs of all of these role-players, a collaborative effort may be required with inputs (financial and technical) being provided by the various players. This is exactly what has transpired in the Upper Olifants River Catchment where DWAF and the coal mining sector via Coaltech have funded a wetland inventory and catchment management strategy for wetlands. The collaboration has been extended to include input from other key role-players such as the provincial conservation agency and NGBP.

In South Africa, consideration should be given to also defining the service area within the context of the general conservation planning that is taking place, and using the conservation planning ecoregions that would already have been delimited. Several provinces in South Africa have invested considerable resources in the development of Biodiversity Conservation Plans, which are now at a fairly advanced stage of development. Within this context, mitigation banks could potentially contribute to achievement of conservation targets contained within the plan.

9.1.5 Transfer of Ecosystem Goods and Services between Locations

The issue as it stands generally

Off-site mitigation effectively involves transferring functional wetland area, and the goods and services delivered by this area, from the development site to the offset site, which are in different locations. While overall there may be a net gain in ecosystem goods and services resulting from an offsite mitigation project, at the local level of the impacted site, there will always be a loss. Furthermore, the people losing the ecosystem services are likely to be different to those gaining ecosystem goods and services. Thus, offsite mitigation has the potential to result in inequities, particularly where those people that stand to lose ecosystem services are not be aware of this fact or are disempowered or do not have a ‘strong voice’ (e.g. as is the case for many of the rural poor).

The issue in the context of South Africa

This issue has particular relevance to South Africa, which has a history of inequality. As would be the case around the issue of magnitude of impact and avoidability, any offsite mitigation would need to be preceded by a full assessment of impacts (i.e. off-site mitigation should never become a means of avoiding the standard regulatory requirements facing any development).

9.1.6 Types of Compensatory Mitigation

The issue as it is articulated in the USA

As described in more detail in Section 3.2, compensatory wetland mitigation includes the following methods:

- Restoration of wetland acreage and functions to an area (re-establishment and rehabilitation)
- Creation of new wetland area and functions
- Enhancing functions at an existing wetland
- Preserving an existing high quality wetland to prevent it from future loss or degradation

These different methods have been assigned preferences for compensatory mitigation in the USA.

Because of the variability associated with landscape position, hydrology, soils and vegetation are difficult to control, the success rate in wetland creation tends to be low when compared to restoration and other methods. Although the improvement above baseline conditions of one or more wetland functions can generate credits, enhancement generally produces less credits than restoration or creation because the degree of improvement to be expected is often marginal and in many cases may not even be measurable using traditional wetland evaluation methods.

Preservation is not a preferred method of credit production because predicting the destruction or degradation of existing wetland areas -- the basic premise justifying preservation -- may be highly uncertain. Furthermore, when preservation is used to compensate for wetland loss, short-term net loss of wetland acreage may occur. Accordingly, preservation may be included as the sole basis for credits only under exceptional circumstances.

The preference rankings are then used to guide the particular mitigation package that is chosen. It is accepted practice, for example, to require a proposed mitigation package to include at least half the compensatory mitigation to take the form of restoration. The other half may consist of any combination of the other compensatory mitigation types.

The issue in a South African context

In South Africa, it would be useful to also recognise these types of mitigation and to assign a preference ranking to these types. However, our preference rankings are likely to vary in accordance with the different circumstances in South Africa when compared with the USA. For example, creation is likely to rank lower and protection higher. South Africa's experience in the creation of wetlands is very limited and is therefore likely to be a higher risk option than in the USA. The protection of wetlands from future headcut erosion is much more of a priority in South Africa than the USA. Owing to the relatively high elevation of the subcontinent, South Africa's wetlands are more vulnerable to erosion than those in the USA and erosion of wetlands is a much more prominent issue.

If protection was used as a means of compensatory mitigation it would have to be demonstrated that the wetlands which will be afforded increased protection are of particular importance and are under demonstrable threat that would otherwise not be addressed. In South Africa, restoration would provide the lowest risk of failure, followed by enhancement, protection and lastly creation.

9.1.7 Methods for Determining Credits and Debits

The issue as it stands in the USA

Determining wetland credits and debits is probably the most central issue to compensatory mitigation and mitigation banking and will be given particular attention. The simplest method for quantifying wetland credit is in terms of acreage. "Using acreage to evaluate credit generation is generally time efficient, cost effective, and does not require the use of professional expertise." However, to simply balance debits and credits of the bank in terms of acres completely discounts the ecological importance and functionality of each wetland. In order to overcome this problem, the functional equivalency approach has been developed. The underlying assumption of the functional equivalency approach is that within a given eco-region (e.g. defined based on climate and geology) wetlands with the same hydro-geomorphic setting will perform ecological processes to a similar level. Functional equivalency integrates wetland science with the determination of credit, and involves a functional assessment to quantify various wetland functions and assign them value. The functional value scores are then multiplied by the wetland area, as will be explained later in the section.

A host of different rapid wetland functional assessment methods exist which can be used in a compensatory mitigation context, e.g., those Adamus *et al.* (1987), Amman and Lindley-Stone (1991), Howe *et al.* (1991); Brinson, (1993) Smith *et al.* (1995), and U.S. Army Corps of Engineers (1995). There are four general classes of methods for determining credits and debits consisting of inventory (uses acreage units), expert scoring (subjective scoring), diversity/production indices (semi-quantitative), and functional evaluation methodologies (single function or multiple function methods). Three commonly used methods are described below:

- **Habitat Evaluation procedure (HEP):**
HEP is a quantitative methodology to determine suitability of an area as habitat for selected species of fish and wildlife. The benefits of HEP include its quantifiable results, structured process, replicability, and the ability to tailor an evaluation to a specific location and important resources.
- **Wetland Evaluation Technique (WET).**
WET 2.0 is a multi-functional evaluation procedure which can be used to assess functions and values of a wetland in terms of its capability to perform a function. That probability is based on: the wetland's physical, chemical, and biological characteristic (effectiveness); the opportunity of a wetland to perform a function (opportunity); and the value of the wetland functions to society (social significance).
- **Hydrogeomorphic Approach (HGM Approach).**
The HGM Approach is an assessment methodology based on the Hydrogeomorphic classification system that classifies wetlands into groups based on geomorphic, water source, and hydrodynamic characteristics of a wetland. Wetland functions are assessed in terms of Functional Capacity Index (FCI). Functional Capacity Index is the ratio of functional capacity under predicted or expected conditions, and the functional capacity under attainable conditions. Attainable conditions are the highest, sustainable level of function achieved across a number of wetlands that have been under minimal long term anthropogenic influence in a landscape. The FCI is then a measure of a wetland function relative to that in similar undisturbed wetlands in the same region.

A general rule is that the same method must be used for assessing both credits and debits in order to promote consistency. Currently the most widely used methods is the HGM (hydrogeomorphic) approach (Brinson, 1993; Smith *et al.*, 1995; Brinson and Rheinhardt, 1996), which is the primary method put forth by the Corps of Engineers for use in Section 404 permitting (22). Thus, the remainder of this section will focus on this approach.

As elaborated upon by Brinson and Rheinhardt (1996), an HGM assessment can be used to determine the minimum area over which restoration should be applied to achieve a no net loss in function objective. This minimum area is determined by examining the degree to which a function is reduced through project alteration in relation to the degree to which a function is increased through restoration. The ratio of wetland area restored to wetland area altered by a project alteration (the compensatory mitigation ratio) varies among functions and is influenced by (1) the magnitude to which any given function occurs at a project site both before and after the site is altered, (2) the magnitude to which any given function occurs at a compensatory mitigation site both before and after restoration is applied, and (3) the rate at which any given function is restored. According to the HGM approach “function” is taken to be synonymous with “ecological processes” (Rheinhardt *et al.*, 1997).

The total hectares of the development site is multiplied by the reduction in its functional value (by comparing before and after) to determine the number of credits required. Similarly, the total hectares of the mitigated site are multiplied by the increase in functional value to determine the number of credits it supplies. For example, if the development wetland was 20 ha and the functional value of the development wetland scored 0.4 before the development and 0.0 after the development then this would equate to the loss of $20 \text{ ha} \times 0.4 = 8 \text{ ha}$ of functional wetland area. If the functional value of the mitigation area is to be increased from a score of 0.6 before to 0.9 after (i.e. an increase of 0.3) then a minimum of 27 ha (giving a functional area of 8.1 ha) would be required to exceed a Mitigation:Development ratio of 1:1. If the required ratio was 1.5:1, e.g., to account for the time required for functionality to be re-instated in the mitigation site, then 40 ha of the mitigation wetland would be required.

Several states have developed assessment methods using the general HGM approach and tailored for the specific wetlands in the state. For example, WAFAM (Washington State Wetland Function Assessment Methods) is the HGM-based method developed for Washington State. WAFAM, like several of the other methods developed for individual states, is in fact a suite of methods, each designed for a particular wetland type (e.g. riverine and depressional wetlands in the lowlands of western Washington and depressional wetlands in the Columbia Basin of eastern Washington).

The first step in setting up the HGM approach is to define regional HGM classes into which wetlands which are functionally similar can be grouped. Wetlands from within the same class are then selected that represent a range in the level of a particular stressor from least to most impacted.

Next, a series of variables or metrics are selected that measure various structural components within a wetland. These variables provide an assessment of functional performance and, thus, reflect loss of function. The values of each variable are scored from 1.0 (least-disturbed condition) to 0.0 (most-disturbed condition). The variables are then arranged into algorithms used to generate FCI (Functional Capacity Index) scores. These algorithms are not simulation models that attempt to mathematically quantify each function. Instead, they provide a score that, depending on the variable values, reflects the extent of departure from the reference standard condition. The FCI scores, like the variables, range from 1.0 to 0.0.

An important advantage of the HGM approach as applied in the USA is that it can be applied rapidly like most other functional assessment methods. However, the disadvantage is that before the approach can be applied, it takes extensive sampling and resources to set up, involving the description of a considerable number of reference wetlands. This may be particularly onerous where the wetlands to be assessed include a diversity of regions (e.g. from humid to arid) and hydrogeomorphic settings (e.g. hillslopes, flats and depressions), requiring a corresponding diversity of reference wetlands.

The issue in a South African context

At a very broad level, the HGM approach has been incorporated into wetland assessment methods recently developed for South Africa (Kotze *et al.*, 2005; Macfarlane *et al.*, 2006), and it would be sensible to, as far as possible, use the HGM approach in determining credits and debits for compensatory mitigation in South Africa. However, given the tremendous diversity of bioregions and wetland types across South Africa, it would be extremely onerous to follow the same detailed, regionalized approach being applied in the USA. This would require the description of a host of different reference wetlands and the development of a suite of different methods tailored for the different HGM type/bioregion combinations represented in South Africa. A long term objective should be to describe these reference wetlands, from which a detailed, well validated method/s could be developed for South Africa. However, in the short to medium term, a more centralized and less detailed approach is clearly required, which although not well tailored and validated across ecoregions, should nevertheless account for a wetland's hydrogeomorphological type and its climatic and geological setting.

It is proposed that this could be achieved through the application of WET-Health and WET-Ecoservices. WET-Health is designed for the rapid assessment of the integrity of South African wetlands in terms of a wetland's deviation from its natural state. WET-Ecoservices is designed for the rapid assessment of the delivery of ecosystem services by South African wetlands. WET-Health and WET-Ecoservices both use the same descriptors for describing a wetland's HGM setting, hydrological zonation and geologic and climatic setting, and their respective assessments are seen as complimentary. Both methods would generally be applied together in a compensatory mitigation assessment but their relative importance would vary depending on the particular mitigation objectives. If the mitigation objective was strongly focussed on re-instating the natural conditions of a wetland then WET-Health would be most needed, but if the primary objective was enhancing a particular ecosystem service (e.g. flood attenuation) then WET-Ecoservices would be most needed. Given that mitigation is about compensating for impacts on wetlands and WET-Health deals far more explicitly with impacts than WET-Ecoservices, it is anticipated that WET-Health would be used to the greatest extent in a compensatory mitigation context.

WET-Health uses the concept of the reference state, and measures deviation from this reference state on a scale of 0 to 10. In this respect it is similar to the HGM approach, which measures deviation on a scale of 0 to 1.0. However, WET-Health identifies ecological processes (hydrology, geomorphology and vegetation) that are more broadly defined than in the HGM approach, and it also does not pre-define an ideal state for the particular HGM type and region against which the wetland is compared. Instead, it relies on the assessor being familiar with the characteristics of wetlands in a particular region.

Both the HGM method and WET-Health use indicators of wetland processes that can be described in the field. For example, in the case of WET-Health, the desiccating effect of artificial drains in a wetland is described based on characteristics of the drains (e.g. drain depth, drain density, etc.) and characteristics of the wetland (e.g. longitudinal slope) rather than based on directly describing the desiccation that has taken place (which is often extremely difficult to undertake in a rapid assessment). The means by which the relationship between the ecological processes and the indicators is derived for the HGM approach differs to that of WET-Ecoservices. In the HGM approach, it is derived based strongly on studies of the specific wetlands in the ecoregion within which it is to be applied, whereas in WET-Ecoservices it is based on the general literature and the accumulated experience of the authors, and to a lesser extent on the specific wetlands in the ecoregion to which it is applied.

Despite these differences between the HGM approach and WET-Health, the same general approach could be applied for assessing compensatory mitigation credits/debits.

1. Describe the level of integrity of the different functional components (i.e. hydrology, geomorphology and vegetation) at a development site (a) before the site is altered and (b) the predicted level of integrity after the site is altered. The difference between (1a) and (1b), together with a measure of the extent of the wetland at the development site, would provide an indication of the compensatory mitigation debits in terms of wetland integrity.
2. Describe the level of integrity of the different functional components at the compensatory mitigation site (a) before restoration is applied and (b) the predicted level of integrity after the site is altered. The difference between (1a) and (1b), together with a measure of the extent of the wetland at the compensatory mitigation site, would provide an indication of the compensatory mitigation credits supplied.

An example is given below of a compensatory mitigation project involving a 10 ha wetland which is to be lost to development and a 30 ha wetland which is to be rehabilitated in order to provide compensatory mitigation (Table 9.1).

For a given wetland area, the greater the functional improvement that can be affected for that area, the greater will be the functional area achieved. Conversely the smaller the improvement, the smaller will be the functional area achieved. In the example in Table 9.1, the integrity of the mitigation site is close to critical (2/10) before the rehabilitation and is increased to 7/10 through rehabilitation (i.e. an improvement of 5/10). This improvement results in the re-instatement of 15 ha (30 ha x 5/10) of hydrologically functional area. The development site starts with an integrity only slightly below pristine (i.e. 9/10) and is reduced to a critical condition after development (0/10) resulting in the loss of 10 ha x 9/10 = 9 ha, and a Mitigation: Development ratio of 1.7:1 (15 ha: 9 ha) is achieved. In the example in Figure 1, if the rehabilitation had been more effective, let us say it had increased the hydrological integrity score to 9 (i.e. an improvement of 7) then this would have resulted in the re-instatement of 21 ha of hydrologically functional area and a Mitigation: Development ratio of 2.3:1. On the other hand, if the rehabilitation had only managed to increase the score to 4, then this would have resulted in the re-instatement of 6 ha of hydrologically functional area and a Mitigation: Development ratio of 0.7:1, which is well below all acceptable ratios cited in the literature.

Table 9.1 A framework for measuring functional integrity credits (from mitigation) and debits (from development) based on a WET-Health assessment, including an example.

COMPONENTS OF INTEGRITY:	HYDROLOGY		GEOMORPHOLOGY		VEGETATION	
	Mitigation	Development	Mitigation	Development	Mitigation	Development
Sites:						
Area*	30 ha	10 ha	30 ha	10 ha	30 ha	10 ha
Before**	2	9	7	7	3	4
After***	7	0	8	6	5	0
Difference****	5	9	1	1	2	4
Difference/10 x Area	15 ha	9 ha	3 ha	1 ha	6 ha	4 ha
Mitigation:Development ratio	1.7:1		3:1		1.5:1	

*Aerial extent of wetland affected by the development/mitigation

** Before the site is altered by the development/mitigation measures, with integrity being scored on a scale of 10/10 (pristine) to 0/10 (critically altered).

***After the site is altered by the development/mitigation measures, with integrity being scored on a scale of 10/10 (pristine) to 0/10 (critically altered).

****Difference between Before and After

For geomorphology, integrity of the mitigation site is increased by 1/10 and for the development site it is decreased by the same amount. For vegetation, the reduction in integrity of the development site is twice as large as the increase in integrity of the mitigation site. Thus, taking into account the size of the respective sites, gives a compensation ratio of 3:1 for geomorphology and 1.5:1 for vegetation.

9.1.8 Replacement Ratios

The issue as it stands in the USA

One of the ways to balance wetland value when assigning credits and debits without the use of technical scientific evaluation is through the use of compensation ratios. Compensation ratios are the “proportional requirements for replacing wetlands that are permitted for fill.” That is, a compensation ratio can be assigned during the permitting process, requiring a permittee to purchase a greater number of credits than those impacted. The Corps is responsible for setting this ratio at the time the permit is granted. For example, if a wetland to be developed is evaluated by the Army Corps of Engineers and found to be of extreme ecological importance to the region, the Corps may assign a compensation ratio of 10:1 for a particular project. In this case, 10 acres of banked credits would be necessary for the destruction of a single acre of developed land. Common ratios for most projects are between 1:1 and 5:1, but ratios of 10:1 have been assigned in extreme cases. The use of compensation ratios contributes to the overall goal of “no net loss” of wetland acres but may not realistically improve U.S. environmental goals because as previously discussed, the function and location of wetlands is not always considered.

The goal of compensatory mitigation is to replace lost wetland functions. Several factors may be taken into consideration when determining an appropriate replacement ratio.

- Risk of failure (long term sustainability). The greater the risk that the compensation project will not perform as proposed, the larger the replacement ratio. Risk of failure has often been related to wetland type. For example, an assessment of compensatory mitigation sites in Indiana showed that the failure rate for shallow marsh was 17% but for wet meadow it was 87%, requiring compensation ratios of 1.2:1 for shallow marsh and 7.6:1 for wet meadow in order to overcome the measured failure rates (Robb, 2002). Another important factor contributing to the risk of failure is requirement that the bank has for ongoing maintenance (described as an individual item at the end of this list).
- Likely time required for achievement of the desired state in the compensation project. The greater the time required, the larger the replacement ratio. Loss of functions usually occurs immediately after a development project is initiated but recovery of functions usually progresses gradually over time and would only be able to compensate for the loss after several years unless the restoration has been initiated well in advance of the development taking place. Thus when a bank's resources are not yet “functionally mature” at the time of withdrawal, they need to be discounted by an amount commensurate with how far they fall short of reaching functional maturity at the time of withdrawal.
- Type of compensation. A more preferred type, e.g. restoration as previously discussed will have a lower compensation ratio than a less preferred type.
- Type and quality of the wetland being impacted upon. The more important the type and the higher the quality of the wetland area being impacted, the higher the compensation ratio. Importance of a wetland type is usually assessed based upon its rarity and cumulative loss. Quality may be measured in terms of level of integrity and/or the delivery of ecosystem services.

- Degree and permanence of impact. The greater the degree of impact and permanence, the higher the compensation ratio.
- Location in the landscape. Compensation projects located in areas where they can contribute to ecosystem functioning at a large scale (e.g. part of a river corridor) may be deemed to require a lower compensation ratio than projects which are isolated in the landscape.
- Effect of the compensation project on functions. The greater the demonstrated replacement of functions or gains in other functions, the lower the replacement ratio.
- Long term maintenance requirements. This refers to the relative ease or difficulty of maintaining the physical and functional integrity of a bank. A bank may be designed to be entirely self-sustaining (e.g., possess dependable hydrologic sources, and have minimal dependence on man-made features) or on the other hand, a bank may rely on engineering features that require frequent input/maintenance, and otherwise has a high degree of artificiality.

Regulatory agencies determine the amount of compensation necessary to mitigate wetland impacts on a case-by-case basis. Which of the criteria listed above are used for deciding on the ratios varies from state to state. For some, it is primarily the first two criteria that are used, while for others, there are many more of the criteria highlighted above which are considered. Although there is no one single algorithm for scoring and combining the different criteria, Tables have been developed which provide applicants with some guidance.

Buffers may be used as part of a mitigation package. Credit for buffers will only be granted after a minimum of 1:1 replacement of wetland area. The amount of credit generated by buffers will generally range from 5:1 to 20:1 and is determined based on the following criteria:

- Degree to which the buffer provides connectivity to other habitat area.
- Quality of the buffer.
- Ability to increase performance of wetland functions.
- Ability to provide additional ecological functions.

The issue in a South African context

As in the USA, there are several factors that can be validly considered when attempting to determine an appropriate compensation ratio. These factors will need to be integrated but in a manner that is fairly simple. Because of the particular circumstances in South Africa, some of these factors will have particular prominence. For example, South Africa's wetlands and their restoration are less well understood than in the USA, and therefore considering the risks of failure is likely to be even more prominent than in the USA. This would apply particularly to certain hydrological settings, e.g. hillslope seepages that are generally less readily re-instated than others, e.g. depressions. In addition, as a general rule vegetation types subject to less prolonged inundation are far less readily restored to close to their previous composition (and therefore far more likely to fail) than those subject to permanent inundation/saturation, which tend to be dominated by one or few clonal species. For example, temporarily saturated hygrophilous grasslands showed very slow recovery following disturbance compared with permanently inundated marsh dominated by the clonal sedge *Cyperus fastigiatus* (Walters *et al.*, 2006).

Table 9.2 Ratios for Projects in Eastern Washington that do not alter the Type or HGM setting of a Compensation Site.

CATEGORY and TYPE of WETLAND	Re-establishment or Creation	Rehabilitation***	1:1 Re-establishment or Creation (R/C) and Enhancement (E)*	Enhancement Only
All Category IV	1:5:1	3:1	1:1 R/C and 2:1 E	6:1
All Category III	2:1	4:1	1:1 R/C and 2:1 E	8:1
Category II estuarine	Case-by-case	4:1 rehabilitation of an estuarine wetland	Case-by-case	Case-by-case
Category II interdunal	2:1 Compensation has to be interdunal wetland	4:1 Compensation has to be interdunal wetland	1:1 R/C and 2:1 E	8:1
All other Category II	3:1	8:1	1:1 R/C and 4:1 E	12:1
Category I Forested	6:1	12:1	1:1 R/C and 10:1	24:1
Category I based on score for functions	4:1	8:1	1:1 R/C and 6:1 E	16:1
Category I Natural Heritage site	Not considered possible**	6:1 rehabilitation of a Natural Heritage site	Case by Case	Case by Case
Category I Coastal Lagoon	Not considered possible**	6:1 rehabilitation of a coastal lagoon	Case by Case	Case by Case
Category I Bog	Not considered possible**	6:1 rehabilitation of a bog	Case by Case	Case by Case
Category I Estuarine	Case-by-case	6:1 rehabilitation of an estuarine wetland	Case by Case	Case by Case

(Washington Department of Ecology, 2004)

9.1.9 Dealing with the Risks of Failure

When using wetland rehabilitation as a means of compensatory mitigation, there are two important sources of risk that need to be considered. The first is the risk that rehabilitation measures will be unsuccessful in achieving the intended rehabilitation outcomes (e.g. drainage channel plugs are unsuccessful in re-instating natural flow patterns and the establishment of hydric vegetation). The second is the risk that even if successful in achieving the intended outcomes, these outcomes may be lost over time through harmful land-use activities (e.g. uncontrolled movement of cattle result in break-down and failure of the plugs which had previously re-instated natural flow patterns and hydric vegetation but are now rendered ineffective; or excessive abstraction of water negates the positive effects of the plugs).

These two sources of risk may be considered jointly to arrive at an indication of the overall level of risk (Table 9.3). The lowest risk option would be to establish a few mitigation banks in protected areas (where the assurance of long term conservation is high) and to begin rehabilitation well in advance of mitigation credits being sold. Developments falling within the service area of these banks that involved unavoidable loss of wetland could then buy credits in the bank based on rehabilitation that was already well underway and was showing good progress.

Table 9.3 Determining the overall risks of failure of a compensatory mitigation project

		Level of protection afforded to the site		
		Land unprotected & no agreement with landholder	Land unprotected but binding agreement with landholder	Land protected & binding agreement with landholder
Level of implementation of compensation	Still in planning phase			
	Implementation in progress & compensation demonstrated to be on track			
	Compensation complete			
Level of risk				
High		Moderately high	Intermediate	Moderately low
				Low

9.2 Legal and Institutional Issues

9.2.1 Appropriate Policy and Legislation

The issue as it stands in the USA

Permits requiring compensatory mitigation are issued in terms of a range of legislation in the USA⁵ including the Clean Waters Act and the Rivers and Harbours Act. It is through this legislation that the process of avoid, minimize and mitigate is applied. As summarised earlier, mitigation banking has developed as one of the preferred mechanisms for meeting the compensatory mitigation requirements of permits issued in terms of these Acts.

Policy and guidelines have been developed over time to improve the effectiveness of mitigation banks in compensating for ecological impacts to wetlands. Other tools required to regulate mitigation banks have been the development of a wetland definition and interagency agreements (MOA between the Army Corps and EPA).

The Federal Guidelines have been criticised for being vague, suggestive documents that lack efficacy. This has prompted various additional policy developments with the recently published update of these regulations (March 2006) designed to address some of the perceived

⁵ 1. Clean Water Act (33 USC 1251 et seq.)

2. Rivers and Harbors Act (33 USC 403)

3. Fish and Wildlife Coordination Act (16 USC 661 et seq.)

4. Regulatory Programs of the Corps of Engineers, Final Rule (33 CFR Parts 320-330)

5. Guidelines for Specification of Disposal Sites for Dredged and Fill Material (40 CFR Part 230)

6. Memorandum of Agreement between the Environmental Protection Agency and the Department of the Army concerning the Determination of Mitigation Under the Clean Water Act, Section 404 (b)(1) Guidelines (February 6, 1990)

7. Federal Guidance for the Establishment, Use, Operation of Mitigation Banks (60 F.R. 58605 et seq.)

shortcomings. The proposed ‘rule’ intends to “*establish performance standards and criteria for the use of permittee - responsible compensatory mitigation and mitigation banks, and to improve the quality and success of compensatory mitigation projects for activities authorized by Department of the Army permits.*”

The USA regulatory framework therefore includes several Acts which require that the “avoid-minimise, mitigate” decision making process is followed, and which make mitigation a condition of authorisation where appropriate. In addition specific policy has been developed to govern the implementation of mitigation banks as the mechanism through which compensation is achieved. The refinement of this policy is an ongoing process.

The issue in the South African context

South Africa has a variety of Acts which require that the impact of a project on the receiving environment is considered before it is authorised. These Acts are summarised below. The avoid-minimize-mitigate hierarchy is entrenched in the decision making process governed by this legislation and the relevant authorities may make mitigation measures conditions of authorisation in which case they are legally binding on the developer.

- *National Environmental Management Act, No 107 of 1998 (NEMA) - EIA regulations as promulgated under Section 5 of NEMA*

NEMA is an overarching statute regulating various aspects of natural resource use, integrated environmental management and pollution control. Underpinning NEMA is a number of principles that aim to achieve sustainable development, and which apply to the actions of all organs of State (Winstanley, 2001). These include:

- That the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
- that pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;
- that the disturbance of landscapes and sites that constitute the nation’s cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and remedied;
- that waste is avoided, or where it cannot be altogether avoided, minimised and re-used or recycled where possible and otherwise disposed of in a responsible manner;
- that the development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised;
- that negative impacts on the environment and on people’s environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied.

New EIA regulations promulgated in terms of Section 5 of NEMA came into effect on 1 April 2006 to give effect to the general objectives of integrated environmental management laid down in section 1 of Chapter 5, and the principles listed in Section 2 of the Act.

These regulations require that authorisation be obtained from the relevant authorities for activities defined in Listing Notice 1 and 2 (published in Government Notice R. 386 and No. R. 387 respectively) before they may be undertaken. While there are several activities listed in Notice 1, and 2 that may impact wetlands, the following relate specifically to wetland resources:

Listing Notice 1:

4. *The dredging, excavation, infilling, removal or moving of soil, sand or rock exceeding 5 cubic metres from a river, tidal lagoon, tidal river, lake, in-stream dam, floodplain or wetland.*

Listing Notice 2:

4. *The extraction of Peat.*

Authorisation is based on the outcomes of an assessment governed by the EIA regulations. The assessment process involves the identification of alternatives and measures that may avoid or mitigate impacts. The regulations require that a draft Environmental Management Plan (EMP) form part of the documentation that must be submitted for consideration of the application. According to Section 34 b) the EMP must include: *information on any proposed management or mitigation measures that will be taken to address the environmental impacts that have been identified in a report contemplated by these Regulations, including environmental impacts or objectives in respect of—*

- (i) *planning and design;*
- (ii) *pre-construction and construction activities;*
- (iii) *operation or undertaking of the activity;*
- (iv) *rehabilitation of the environment; and*
- (v) *closure, where relevant.*

Once accepted, the EMP becomes a condition of approval and its implementation is thereby legally enforceable.

While mining is a listed activity under the NEMA EIA regulations, environmental impacts associated with this activity have historically been considered in terms of mining legislation. It was proposed that continue until 1 April 2007, from which point it was intended that environmental impacts arising from mining will require consideration in terms of the NEMA EIA process. Despite this deadline being passed, this change has not come into effect and the environmental impacts of mining are still considered under Section 38 of the MPRDA which governs *“Integrated environmental management and responsibility to remedy*. This section requires that:

(1) *The holder of a reconnaissance permission, prospecting right, mining right, mining permit or retention permit—*

- (a) *must at all times give effect to the general objectives of integrated environmental management laid down in Chapter 5 of the National Environmental Management Act, 1998 (Act No. 107 of 1998);*
- (b) *must consider, investigate, assess and communicate the impact of his or her prospecting or mining on the environment as contemplated in section 24(7) of the National Environmental Management Act, 1998 (Act No. 107 of 1998);*
- (c) *must manage all environmental impacts—*
 - (i) *in accordance with his or her environmental management plan or approved environmental management programme, where appropriate; and*
 - (ii) *as an integral part of the reconnaissance, prospecting or mining operation, unless the Minister directs otherwise;*
- (d) *must as far as it is reasonably practicable, rehabilitate the environment affected by the prospecting or mining operations to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development; and*
- (e) *is responsible for any environmental damage, pollution or ecological degradation as a result of his or her reconnaissance prospecting or mining operations and which may occur inside and outside the boundaries of the area to which such right, permit or permission relates.*

Section 39 of the MPRDA regulations outline the process for EIA process that gives effect to the IEM requirements listed above. As in the case of the EIA regulations, the MPRDA EIA process requires that the applicant undertake an EIA which meets the minimum requirements for

assessment and principles of NEMA, and which includes the development of an Environmental Management Programme in which the applicant must

(d) describe the manner in which he or she intends to—

- (i) modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;*
- (ii) contain or remedy the cause of pollution or degradation and migration of pollutants; and*
- (iii) comply with any prescribed waste standard or management standards or practices.*

The MPRDA regulations require that mitigation actions are developed to a level which allows them to be quantified e.g. in terms of time, materials and cost. Authorisation is only granted once financial guarantee covering the estimated cost of rehabilitation and mitigation measures is submitted to the DME by the applicant. This guarantee is provided upfront and as such is designed to protect the State against having to bear the often substantial costs of rehabilitating mining sites in the event that the mine become insolvent during operation.

National Water Act, No 36 of 1998

Section 21 of the National Water Act, No 36 of 1998 (NWA), lists a number of water uses, for which ‘water use licenses’ are required before a water user may undertake these activities. These include:

- (a) taking water from a water resource;*
- (b) storing water;*
- (c) impeding or diverting the flow of water in a watercourse;*
- (d) engaging in a stream flow reduction activity contemplated in section 36;*
- (e) engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);*
- (f) discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;*
- (g) disposing of waste in a manner which may detrimentally impact on a water resource;*
- (h) disposing in any manner of water which contains waste from, or which has been heated in, any industrial or generation process;*
- (i) altering the bed, banks, course or characteristics of a watercourse;*
- (j) removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and*
- (k) using water for recreational purposes.*

Several of the uses listed under Section 21 apply to mining activities and companies normally apply to the DWAF for an ‘integrated water use licence’. This application process runs in parallel with the EIA process under the MPRDA or NEMA.

In terms of section 29 (1) of the Act, “A responsible authority may attach conditions to every general authorisation or licence:

(b) relating to water management by -

- (i) specifying management practices and general requirements for any water use, including water conservation measures;*
- (ii) requiring the monitoring and analysis of and reporting on every water use and imposing a duty to measure and record aspects of water use, specifying measuring and recording devices to be used;*
- (iii) requiring the preparation and approval of and adherence to, a water management plan;*

DWAF may therefore issue conditions that include management measures. According to Muir (*pers comm.*), DWAF consider technical information, the EIA and EMPR which they provide comment on through the MPRDA process, in making a decision and associated conditions of any license issued under the NWA.

Importantly, NEMA contains provisions regarding an obligation to conduct environmental impact assessments for proposed activities, even where they are not those identified by the minister in Listing Notice 1 and 2 under Section 5 of the Act. Section, 24 (3) (d) makes it clear that the minimum requirements for EIA stipulated in NEMA must be applied in the assessment of any activity that has the potential to negatively impact the environment and which requires authorisation by an organ of the State.

There is therefore adequate legislation that applies the avoid-minimise-mitigate hierarchy and which mandates the applicant to implement mitigation measures identified through this process as conditions of approval.

Legislation accounting for the specific requirements of wetlands (e.g. a legally defensible definition of wetlands⁶) and official guidelines for the delineation of wetlands also exists.

What is lacking are guidelines designed to administer specific compensatory mechanisms such as mitigation banks. The extent and scope of guidelines to administer a mitigation bank is dependant on the mechanism selected and model applied in its implementation.

Once selected, the NGBP intend developing such policy through the implementation of a pilot project rather than through traditional approaches. The pilot approach is favoured because it allows a wider range of stakeholders to be involved, something which is not always the case in traditional approaches where draft policy developed by government is circulated for comment. A working case study also allows technical and institutional issues to be identified which is not possible when developing policy from a researched or theoretical basis. This point is particularly relevant given the technical nature of certain components of a wetland mitigation bank discussed in the previous section.

9.2.2 Regulatory and other Responsibilities

The issue as it stands in the USA

The overlapping jurisdiction of wetlands from federal, state, local and private perspectives poses major problems for the oversight of mitigation banks and their use (Fleming 2004). Under Section 404 of the CWA, each state is permitted to establish its own Section 404 permitting program after approval from the EPA and Army Corps. However, by 2004, only two states have implemented the program: Michigan and New Jersey. There are several reasons why states choose not to direct their own Section 404 permit programs. Many states feel that the federal program is sufficient and choose simply not to bother and certain states use federal oversight as a scapegoat in situations when state and local agencies may have personal or political influences. Initially, the idea of handing regulatory responsibility to the states seemed to be the simplest solution to this problem. However, this option has not been taken as it was felt that decentralising regulatory authority would open it up to local political influences, also undermining the consistency with which the programme is applied, and that this is therefore not the solution.

The issue in the South African context

There is no single policy or Act in South Africa which attributes specific responsibility for the protection and management of wetlands to a single organ of state or department. Rather, responsibility lies with several departments in terms of different legislation as summarised in

⁶ As provided in the National Water Act, No 36 of 1998.

Table 9.4. The responsibility provided for in these Acts varies from specific responsibilities for certain components of wetland management, such as the determination of reserve requirements by DWAF under the National Water Act, to mapping and inventory as part of conservation planning initiatives required in terms of National Environmental Management Biodiversity Act (NEMBA).

Table 9.4 Government departments and agencies with a mandate to protect and manage impacts to wetlands and the relevant legislation affording the mandate.

LEGISLATION/Mandate	AGENCY/ Department
National Water Act, No 36 of 1998 (NWA) - Chapter 3, Protection of Water resources - Chapter 4, Use of Water- Licensing of Section 21 Water uses - Chapter 7 Establishment and operation of Catchment Management Agencies (CMAs) (establishment of catchment management strategies).	Department of Water Affairs and Forestry (DWAF) Catchment Management Agencies (CMAs)
National Environmental Management Act No, 107 of 1998 (NEMA). - Section 28 duty of care and remediation of environmental damage. - Chapter 3 Procedures for Co-operative Governance	Department of Environmental Affairs & Tourism (DEAT) - National and provincial departments.
EIA regulations Promulgated under section 5 of NEMA. - Consideration of development activities with the potential to cause environmental degradation and enforcement of conditions of authorisation (mitigation measures).	Department of Environmental Affairs & Tourism (DEAT) - National and provincial departments.
Conservation of Agricultural Resources Act, No 43 of 1983 (CARA) Key focus on agricultural resources but with indirect implications for wetlands – primarily the regulations which regulate the rehabilitation of wetlands:	National Department of Agriculture (NDA) - supported by provincial Departments of Agriculture)
Minerals and Petroleum Resources Development Act, No 28 of 2002 (MPRDA) and regulations - Section 37. Environmental management principles - Section 38. Integrated environmental management and responsibility to remedy - Section 39 Environmental management programme and environmental management plan	Department of Minerals and Energy (DME) – provincial/regional offices
Provincial Nature Conservation Legislation - Specific to provinces and concerned with conservation of biodiversity.	Provincial Conservation Agencies
National Environmental Management: Biodiversity Act No 10 of 2004 (NEMBA), - Chapter 4 Threatened and protected ecosystems and species - Section 11 Co-ordinate and implement programmes for the rehabilitation of ecosystems	South African National Biodiversity Institute (SANBI) (Working for Wetlands)

The issue of whether responsibility for wetlands should be shared or rest with a single government organ was recently the basis for debate between wetland managers and ecologists within the consulting sector, government departments, NGOs and academic field. The debate played out over the national wetland list-server during 2005.

Those in support of a single responsibility defined by specific wetland legislation argued that wetlands resources are not being managed effectively because responsibility is falling between the various agencies that currently have varying levels of responsibility. Those in support of the status quo suggested that multiple Acts imply multiple responsibility, a situation that should be beneficial to wetlands. It was also argued that implementation of existing legislation is poor in

South Africa, and that developing yet another Act would further dilute limited human and financial resources.

While it is not the intention of this study to find an answer to this issue, what the discussion does highlight is the fact that effective co-ordination is required under the current legislative framework in order to ensure effective management of wetland resources. This need is further entrenched by:

- The fact that there is no process currently underway to establish a single wetland Act and the situation is unlikely to change in the foreseeable future.
- Intergovernmental co-operation is a specific requirement of NEMA.

Achieving co-operative governance in day to day operations has proved a major challenge in South Africa as departments generally aim to meet their mandate as defined in specific Acts for which they are responsible. Co-operative governance is often construed as an additional requirement or distraction to meeting individual targets. An example of this is the illegal cultivation of 'virgin' land which was taking place in KwaZulu-Natal. This activity requires authorisation under CARA and the NEMA, EIA regulations. Cox and Youens (2003) reported that the National Department of Agriculture (NDA) were ignoring their responsibility under NEMA to engage the provincial arm of DEAT and issuing licenses to cultivate virgin land under CARA prior to authorisation being granted under the EIA regulations. The NDA contended that "because the EIA process takes far longer than that what is necessary to issue a decision in terms of CARA that it was affecting the NDA's service delivery". The consequence of this stance was the illegal cultivation of 'virgin' land. Increasingly however, various forums have been established to meet the co-operative governance requirements of NEMA. The License Application Advisory Committee (LAAC) is an example of such a forum. The LAAC includes various government authorities and jointly considers applications for commercial forestry which requires licensing under several Acts.

In terms of establishing a mechanism to offset impacts to wetlands, South Africa is in the unique position of having the WfW programme. As a National Programme responsible for co-ordinating the rehabilitation of wetlands, WfW is therefore likely to play an important part in any banking system that is implemented. Given its mandate, expertise and experience WfW is well placed to play not only a co-ordinating role, but to also undertake specific elements or activities, particularly implementation which forms a key focus of the programme's work.

WfW can however not operate as player and referee. The other agencies and government departments listed in Table 9.4 have a role to play. An interagency agreement is required, that clearly defines the roles and responsibilities of each agency and at what stage the legislation they administer should be applied in the process of establishing and operating a bank. This agreement would play the same role that the banking instrument plays in the USA model. The agreement needs to be designed in a way that the role played by different departments assists them in meeting their mandate, and thereby cements their commitment to playing an effective role in managing the bank.

9.2.3 Accessing and Securing Mitigation Sites

The issue as it stands in the USA

The need to define measures to protect land on which rehabilitation has taken place in perpetuity is a basic requirement that must be met before the Banking Instrument is accepted by the Army Corps. Legal instruments that are considered in achieving this include:

- conservation easements,
- deed restrictions,
- restrictive covenants, or
- title transfers

The legal instrument needs to account for land-use activities that will negatively impact the mitigation systems on a property and identify those which are compatible with that use. Activities which may not be physically disruptive such as non-intensive outdoor recreation, recreational hunting and fishing, research and nature study are generally regarded as compatible uses. However, activities which are clearly physically disruptive such as surface mining and agricultural cultivation (unless specifically required for wetland management) are in general viewed as incompatible with bank purposes.

In the majority of cases, it is understood that properties are purchased outright and once the bank credit has been depleted, that it is provided with some level of protected area status.

In terms of accessing properties on which priority wetlands are located, bank sponsors normally purchase the land upfront or enter into agreements where easements are provided (the landowner is paid to take his land out of production). This is possible because the vast majority of bank sponsors are government agencies such as a Department of Transport who set up banks to mitigate their anticipated impacts defined through their planning process. They are able to do this because they have the capital necessary to do so. Alternatively entrepreneurs who establish banks obtain finance on the basis of agreed banking proposal to do so.

The issue in the South African context

While compensatory mitigation for wetlands via offsite mitigation and mitigation banking may be new concepts in South Africa, wetland rehabilitation has been undertaken in South Africa by various organisations over the last decade. The Mondi Wetlands Project (previously the Rennies Wetlands Project) has used rehabilitation as a vehicle to generate interest in and train people in various aspects of wetland management. The WfW programme has also been in operation for several years.

In the majority of cases rehabilitation sites are located on private land, much of it utilised for agricultural purposes. Rehabilitation efforts are therefore largely dependant on the goodwill of the landowner. Where commitment is obtained, landowners sign an agreement to take responsibility for the rehabilitation works after a certain period and undertake not to implement any land use or develop infrastructure such as roads or dams that would impact the wetland. This agreement is however not legally binding on the landowner who signed it, or on future owners of the property. The lack of a legal instrument for securing rehabilitation works in the long term places any resources allocated to such work at risk of being wasted. This issue is a major concern to the WfW programme and needs to be addressed to secure wetland rehabilitation efforts, whether mitigation banking is adopted in South Africa or not.

Allied to the issue of securing wetlands in perpetuity, are the difficulties associated with accessing priority wetlands for rehabilitation or protection. A landowner's decision to agree to mitigation on their property is largely linked to whether or not they are deriving an income from the wetland. As discussed by Botha (2001), it is becoming increasingly difficult for farmers to make a living. Economic hardships brought on by open markets and commodity fluctuations have pinched farming economies, reduced demand for wage labour and restricted cash available for conservation or sustainable land management.

Furthermore, while various Acts make it illegal to drain or impact wetlands in other ways, landowners are able to continue farming wetlands that were 'developed' (drained etc) prior to 1983 when CARA came into effect. Given the pressures discussed by Botha (2001) farmers currently seek to maximise production from every hectare of available land. Consequently there are large areas of impacted wetlands which remain under production and owners of this land are not obligated to restore these areas. Accessing potential mitigation or bank sites requires incentives which make it worthwhile for the landowner to alter his land-use for the benefit of conserving natural systems and improving their functionality.

In a context of poor regulatory incentives and limited financial incentives accessing appropriate sites within a catchment is often not possible. The result may be a range of smaller less important sites spread across the catchment. This reduces the opportunity to maximise the ecological benefits of wetland rehabilitation within a catchment. Furthermore, operating in small, widespread systems reduces the economies of scale gained from rehabilitating large key systems in a catchment.

This issue was highlighted in the case of the off-site mitigation project for Spring Grove Dam discussed in section 7.1. As indicated in Table 9.5 approximately 1100 ha of wetland were identified for rehabilitation, of which 543 ha were not available because they are being actively farmed and landowners were not interested in considering rehabilitation on the property. A further 177 ha were available on condition that the landowners were compensated in some way. Types of compensation mentioned by landowners related primarily to water rights and included; increased access to water from the proposed storage dams, and licenses to build or heighten dam walls. For various reasons DWAF was not able to consider any of these options.

Table 9.5 Breakdown of landowner response to concept of off-site mitigation in Upper Mooi River Catchment (Cox, Kotze and Russel, 2004).

Landowner Response	Area of Wetland (ha)
<i>Support</i>	338.1
<i>Conditional Support</i>	177.6
<i>Unavailable</i>	543.6
<i>No reply</i>	31.9
TOTAL	1091.2 ha

Owing to the lack of incentives agreement was only obtained to rehabilitate 338 ha of wetland, thereby falling short of the mitigation target of 492 ha. Furthermore, of the 338 ha approximately 20% was located in the affected Mooi River Catchment. The remaining 80% of the mitigation was planned in the adjoining Mgeni River Catchment. This resulted in one of the key principles defined in the aims of the project not being met i.e. to mitigate within the affected catchment.

The Conservation Unit of the Botanical Society (Botha, 2001) defines incentives as: *measures that positively influence the way people think or behave*, and define five different types of incentives.

1. Motivational incentives underpin all others. They focus on education and communication and appeal to people's basic nature to conserve.
2. Voluntary schemes provide for recognition and emotive benefits of doing the right thing.
3. Property or Rights-based incentives grant added development- or use-rights in exchange for some commitment to conservation. Price-based incentives are similar and add value to property in return for a public-good benefit.
4. Fiscal and Economic incentives translate into a financial reward, direct or indirect, for a conservation service. This may take the form of tax relief (indirect) or cash grants and subsidies (direct).
5. Regulatory incentives are rules and laws guiding behaviour. They are usually precautionary standards to protect against biodiversity loss and provide an essential safety net.

Stoneham *et al.* (2003) on the other hand identifies 3 types of policy instruments to protect biodiversity and describes them as:

- Legislative instruments: It is against the law to destroy the habitat.
- Voluntary agreements: 'Please don't destroy the habitat'.
- Market based instruments: How much would need to be paid to conserve the habitat?

Botha (2001) concluded that South Africa lacked effective incentives and was lagging behind several other countries that had at this point been effectively operating various mechanisms. Botha also identified several opportunities for addressing the situation. His report was compiled in 2001 and several of the options he listed have been pursued in the interim. There is in fact currently significant effort being allocated to the development of stewardship programmes in various provinces that are developing and applying these incentive options.

The following discussion considers some of the incentive options currently available or being developed in South Africa for accessing the most important mitigation sites and mechanisms for securing mitigation efforts in the long term.

9.2.3.1 Application of measures provided for under CARA

Application of the legal measures provided for in CARA represents a regulatory incentive in terms of the definitions provided. The aim of CARA is to provide for the conservation of the country's agricultural resources and it allows for the regulation of activities which negatively impact wetlands. According to Winstanley (2001) CARA regulates wetland rehabilitation in so far as an activity falls under the definition of "conservation" which, in relation to the natural agricultural resources includes the protection, recovery and reclamation of those resources (Section 1).

The Minister of Agriculture may prescribe control measures with which all land users must comply. According to Winstanley (2001) these include measures in accordance with section 6(2) concerning the

- Utilization and protection of vleis, marshes, sponges and water courses.
- Regulation of the flow pattern of water
- Restoration and reclamation of eroded land, and the
- Restoration and reclamation of disturbed or denuded land.

Where a soil conservation works is implemented, a directive is issued which mandates the landowner to maintain the conservation works in perpetuity at their own cost.

As a further mechanism for accessing and securing land for rehabilitation, if the Minister is of the opinion that it is necessary for the restoration and reclamation of the natural agricultural resources, he may expropriate that land.

According to Kleyn, (*pers comm.*) a directive can be written so that it is binding on future owners of a property. The National Department of Agriculture (NDA), the Mondi Wetlands Programme and WfW have explored the option of developing landowner agreements that are designed to be supported by a directive issued under CARA that would serve to secure the rehabilitated wetland. Most landowners who are supportive of wetland rehabilitation on their property require some form of long term of security and may be willing to sign such an agreement. To date such an agreement has not been developed. One of the factors contributing to this is the responsibility associated with monitoring the conditions of, and enforcing such directives. According to Klein (*pers comm.*) while the mandate lies with NDA, they lack the capacity necessary to draft, monitor and enforce such directives.

In the case where landowners are not in favour of consenting the options include expropriation under CARA. This would require proof by the state that the landowner is responsible for damage to agricultural resources as defined in the Act. Such a process is likely to be lengthy and resource intensive. Of more concern is that it is a heavy handed approach, which is likely to upset landowners in an area/catchment where a more general effort may be underway to generate interest in wetland mitigation and build partnerships with landowners in a manner that benefits everyone. Furthermore, land reform has generated a level of uncertainty for commercial farmers and tenure is a sensitive issue.

The last point to note with regards the application of CARA is that it is due to be replaced by the Sustainable Use of Agricultural Resources Act (SUAR) which is presently still a Bill. This could be viewed as an opportunity to include mechanism within this Act to deal with the issue under discussion.

9.2.3.2 Protected Areas Status

The national and provincial stewardship programmes are utilising the mechanisms summarised in Figure 9.2⁷ to achieve long term biodiversity conservation. There are three levels of conservation status that can be allocated to a property or sections thereof. These range from conservation areas, to properties being awarded full protected area status under the Protected Areas Act, No 57 of 2003 (PAA). As indicated in Figure 9.2, the higher the level of commitment to conservation expressed by the landowner (determined by the conservation status allocated to a property), the greater the benefits available to the landowner.

▪ Special/ Nature Reserve

There are two options under which a property or section thereof can be declared a formally Protected Area in terms of the PAA. The first is a 'Special/Nature Reserve' under Sections 20 and 23. The Nature reserve option is advised for critically important sites, especially those that contain examples of threatened ecosystems (such as renosterveld or lowland fynbos) or contain unique and exceptional biodiversity features. Areas that have been previously disturbed (e.g. old agricultural fields) would generally not qualify for this status. This option has secure, legal status on three levels:

- 1) A Contract Nature Reserves must be declared a provincial nature reserve by the provincial MEC. For this to be effected, the landowner and MEC must sign a letter of consent to declare it a nature reserve, which must also include the restrictions for the site.
- 2) A legal contract (also referred to as a Management Agreement for the site) is entered into between the landowner and the agency.
- 3) A Notarial Deed is drawn up for the site detailing the restrictions which are placed on the title deed and these mandate any new owner to continue adhering to the restrictions in the notarial deed.

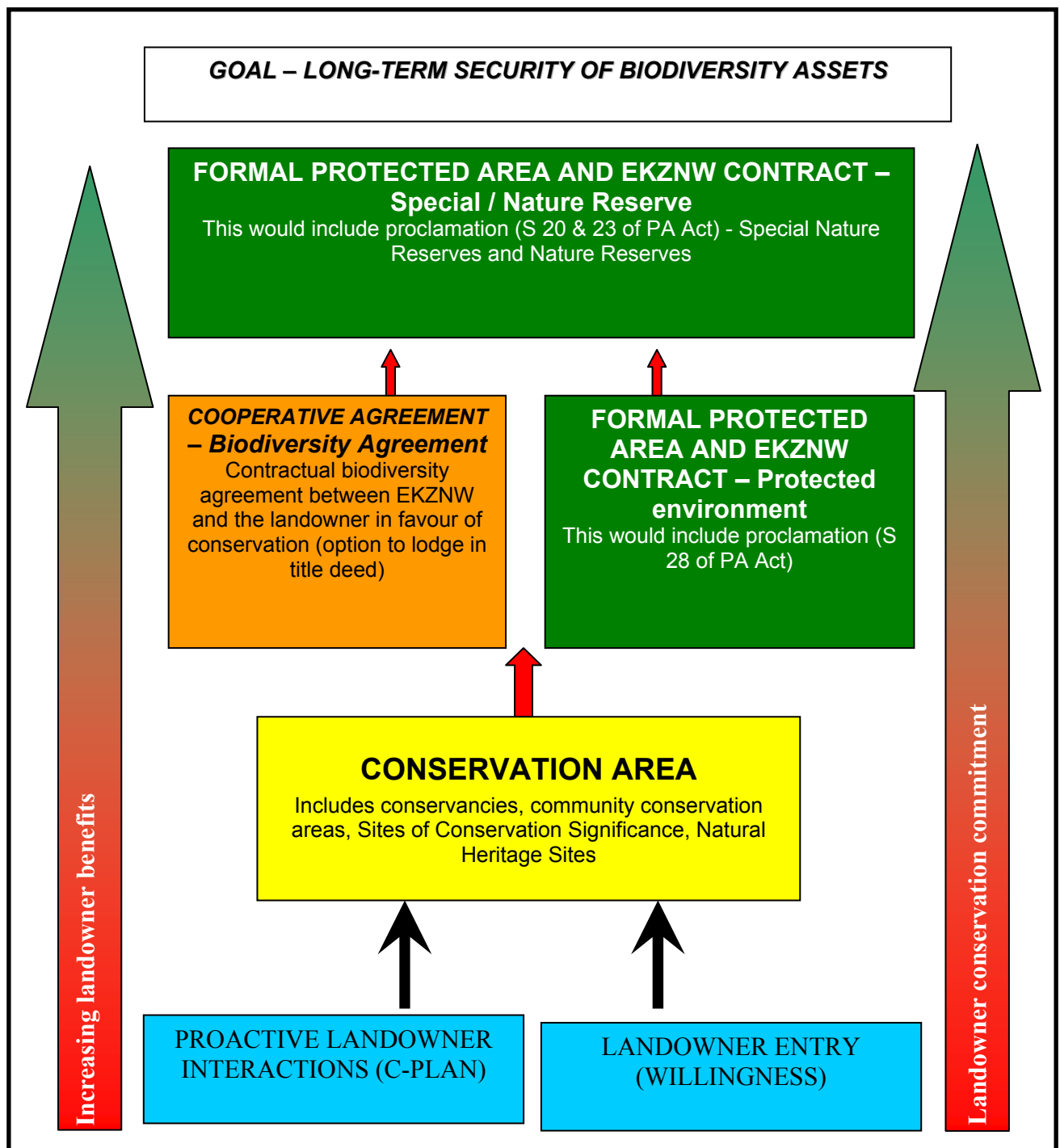
There are specific limitations and restrictions on contractual National Parks and Nature Reserves:

- a) There must be a management authority (in theory, this could be the owner) and a management plan must be drawn up.
- b) Access to privately-owned land must be governed by some agreement with the management authority; it is not necessarily open to the public, and the landowner does not have automatic rights to allow anyone to access the land.
- c) No mining or prospecting is allowed within the contracted area.

The restrictions are recorded on the title deed of the property; they bind future owners, and will be in force for a minimum period (usually not less than 30 years).

⁷ This is a summary of the options available to landowners in KwaZulu-Natal and was provided by Kevin McCann - Manager of the Stewardship Unit within Ezemvelo KZN Wildlife. While the figure represents the KZN model, the options and principles remain the same across other provinces.

Figure 9.2. Conservation agreement arrangements for landowners



According to McCann (*pers comm.*), the following benefits to landowners from having their property declared as a formally protected nature reserve.

- The main incentive available in South Africa at this stage for Contract Nature Reserves is municipal rates exclusion for the conserved area, as provided for in the Local Government Municipal Property Rates Act 2004. The provision in the Property Rates Act which makes this incentive applicable “Section 17.1 (e) states the following:

17. (1) A municipality may not levy a rate—

(e) on those parts of a special nature reserve, national park or nature reserve within the meaning of the Protected Areas Act, or of a national

botanical garden within the meaning of the National Environmental Management Biodiversity Act, 2004, which are not developed or used for commercial, business, agricultural or residential purposes;”

- Substantial assistance from the agency should be provided for specific habitat management interventions, such as alien plant clearing, fencing, fire & game management, based on the resources available to the agency.
- These sites should also have preferential access to government land management programs, such as Working for Water.
- Enhanced recognition and marketing exposure could be provided by the agency through the agencies marketing networks (e.g. website, magazine articles), should the landowner want any ecotourism assets marketed.
- The agency will draw up a Management Plan for the property (in more detail than that for a Biodiversity Agreement), with the input and consent of the landowner to guide and schedule management actions.
- All other incentives available to Biodiversity Agreements are also applicable.

In addition to existing incentives, others have been proposed – for example: all assistance and incentives relating to Biodiversity Management Agreements should also be made available to contract protected areas (e.g. assistance from conservation agency staff in drawing up management plans).

A range of taxes and duties may be waived⁸, as the property concerned has been encumbered with restrictions in the public interest. This would include being exempt from transfer duty⁹ should the property be sold, estate duty should it be inherited, and donations tax if the property or the servitude over it is donated to a recognised conservation agency

Importantly this mechanisms allows the landowner (within the bounds of the management plan and private areas) to continue with commercial activities. This is also important from the perspective of the National Department of Agriculture, who are concerned with the loss of prime agricultural land to other land-uses such as urban expansion and high value estate developments in rural areas (Cox and Youens, 2004). Taking whole properties out of production for conservation purposes would raise this issue. The aim of stewardship programmes is to conserve biodiversity within productive landscapes.

While these option provide various incentives, McCann (*pers comm*) suggests that managing small widespread formally protected areas within existing landscapes is unlikely to be a practical option and applicable in the case of securing wetland mitigation sites. Furthermore, it requires that the sites are pristine and would therefore not apply in the case degraded wetlands systems identified as cases for rehabilitation. This option may therefore only be applicable in the case of protecting a large pristine wetland system.

▪ Protected Environment Status

The second option available in terms of Section 28 of the PAA is the proclamation of a property as a Protected Environment. According to McCann (*pers comm*) this option is more suitable in the case where several landowners wish to maintain the existing nature of the landscape, and where the level of biodiversity does not warrant ‘Nature Reserve’ status. It is likely to be used in limited circumstances. An appropriate example may be where a conservancy wishes to avoid any further degradation of the biodiversity located on participating properties.

⁸ Precedent for the waiver of transfer duty exists in the Provision of Land and Assistance Act of 1993.

⁹ The future status of transfer duties is uncertain.

As with a Nature Reserve, a proclamation by the MEC is required as well a land-use management plan that is developed in consultation with the Provincial Conservation Agency.

Unlike the nature reserve, it is not a specific requirement that the proclamation and biodiversity agreement be included in the title deed. This remains an option the landowner may take up. Furthermore, while in the case of a nature reserve, the title deed is actually amended, in the case of the protected environment the relevant documentation is attached to the title deed. It can therefore be amended by the landowner who agreed to the proclamation, or any future owner of the property.

The reduced level of security results in reduced benefits. Exemption from property rates does not apply because there is no long term security for biodiversity in terms of the rates foregone.

The restrictions on land-use within a protected environment are less stringent than in a nature reserve. Landowners can continue with productive land-use within the bounds of the land-use management plan.

9.2.3.3 Cooperative (biodiversity) Agreements

These are negotiated legal agreements between a conservation agency and a landowner for conserving biodiversity in the medium term (10 years have been suggested). They are considered suitable for conservation worthy land which is in a relatively pristine condition, including small isolated fragments. The Cooperative (Biodiversity) Agreement option is catered for in the National Environmental Management: Biodiversity Act, Act No. 10 of 2004 which allows for the establishment of a Biodiversity Management Agreement (BMA) to implement any Biodiversity Management Plan. The regulations necessary to provide for the establishment of these agreements have yet to be developed. Until these are available conservation agencies are relying on contract law to establish these agreements with landowners.

It is not necessary to re-zone the land, and access is limited to the landowner, provided the access is consistent with the provisions of the legal agreement. The land must be managed in such a way that will support natural processes, which generally excludes any activity that may adversely impact any indigenous fauna and flora or their habitats and the natural state and flow of any water resource such as construction, prospecting, mining, subdivision, dumping, or commercial hunting.

Any person or organisation may submit a plan to the Minister for approval. Security is provided for the land in that, should the landowner or agency not adhere to any of the terms in the contract or the Management Plan, then the other party can be prosecuted for breach of contract and may take any necessary measures to remedy the breach and recover costs and any damages from the offending party.

The legal effect of BMA would be very similar to a personal servitude under South African law as the conservation agreement would generally be of a limited duration and would only bind the current landowner and not his or her successors in title. However, legal provision could be made to register these conservation agreements against the title deeds of the property which would result in them having a similar legal effect to a public servitude.

This conservation option may well be a means of making landowners eligible to receive assistance from government for land management in future. This assistance could be in the form of alien clearing investment from Working from Water, dedicated extension support from a conservation agency, or the ability to deduct land management expenses from income tax. A BMA should flow directly from a Biodiversity Management Plan. Because a landowner must consent to a BMA, there is an obvious element of willing compliance.

9.2.3.4 Conservation Areas

This concept is considered applicable to any natural land and includes options such as conservancies, community conservation areas, Sites of Conservation Significance, Natural Heritage Sites.

No specific duration is specified, and the designation is valid for as long as the landowner wishes it to be. Rezoning is not required and the landowner determines who may access the land.

As these arrangements are entered into purely on a voluntary basis, they have no legal standing, and when the property is sold, the new owner is under no obligation to continue the designation as no restrictions are placed on the title deeds.

There is no legal contract involved and the area is recognised as a conservation area once the necessary application form has been completed and approved by the relevant conservancy agency. A certificate of recognition could be awarded for the property.

It is suggested that benefits offered at this level should include professional advice and support from the agency through basic extension services.

Significant habitat management assistance and other costly assistance should rather be given to the options with legal status so that there is an incentive for a landowner to want to consider a stewardship option with more restrictions and legal security.

Assistance with management plans and could be provided but at a very basic level and without as much time investment of the extension officer as would be provided for in management plans for the other two types of stewardship options.

9.2.3.5 Contract Law

The Working for Wetlands Programme has recently revised the documentation that defines the contractual relationship between the Programme and landowners on whose property rehabilitation is undertaken. This set of documents includes:

- i. A covering letter and consent form, to be signed by landowner, agreeing to wetland rehabilitation taking place on their property¹⁰.
- ii. Terms And Conditions For Carrying Out Wetland Rehabilitation On Private Land By Or On Behalf Of The Working For Wetlands Programme Of The South African National Biodiversity Institute.

Importantly the contract defines the responsibility of the Programme and the landowner prior to, during and following rehabilitation. With regards post rehabilitation, Clause 21 of the current version of the contract reads as follows, *“The Landowner shall maintain the wetland and the rehabilitative structures constructed under the Rehabilitation Works in a condition where further degradation of the wetland is effectively controlled.”* Entering into a contractual relationship will provide legal recourse to WfW in instances where a landowner defaults on the conditions of the agreement and undertakes actions which damage or undermine the rehabilitation efforts.

A limitation of the contract is that it is between WfW and the landowner and is not linked to the property. Consequently it is not binding on future owners of the property.

¹⁰ Consent is required from any landowner before proceeding with an activity which requires authorisation in terms of the EIA regulations promulgated in terms of chapter 5 of the National Environmental Management Act, 1998, published in Government Notice No. 385 of 21 April 2006

9.2.3.6 Financial Incentives

McCann (*pers comm.*) confirmed that several landowners had applied for their properties to be declared nature reserves primarily and only because of the status it afforded the property. They were not concerned about financial compensation for doing so. However experience of the WfW programme and projects such as the Spring Grove Dam example show that in many cases if land is to be taken out of production, landowners need to be compensated. Of the incentives discussed to date few provide for significant financial benefits that would offset such financial demands. In this regard, McCann (*pers comm.*) confirmed that the saving in rates, transfers duties etc (even when added to other benefits such as alien clearing programs) that a landowner would enjoy when declaring their property or sections thereof a nature reserve, are unlikely to offset the income generated from 'farmed' wetlands.

A range of financial mechanisms are necessary to provide for cases where compensation for loss of income is necessary to facilitate landowner agreement to mitigate on their property. Several options are discussed below.

- *Payment for Ecological Services*

In discussions with landowners in the Mooi River Catchment, Cox, Kotze and Russell (2003) reported that several were willing to consider rehabilitation on their property if in return; they were able to secure additional water rights or obtain water use licenses. While Pott, Niewoudt and Dockel (2006) document the problems associated with allocation and trade in water rights in the present South African regulatory climate, a reduction in or removal of water charges may present the level of financial incentive for landowners to agree to wetland mitigation taking place on their property. Or if not adequate they may be sufficient when added to the other benefits available to landowners which enter in Biodiversity Management Agreements.

The rationale for this proposal is that wetlands are important to various hydrological processes that ensure the supply of good quality of water in a catchment. By reducing or removing water tariffs, the landowner would be compensated for foregoing income in the interests of the public good. 'Payment for ecological services' is the reverse concept of the 'polluter pays' principle.

It is suggested that the reduction in revenue from sales of water to such properties be met by large users and specifically those responsible for damaging wetlands or polluting water resources in the catchment. This would avoid users in the catchment who are not impacting the resource directly, from bearing the costs of the saving by landowners committed to wetland rehabilitation. For this incentive to be appropriate and viable, the landowner would likely need to be a substantial water user such as an irrigator.

This concept is just that, a concept, and would require substantial investigation and consideration by the relevant stakeholders particularly DWAF. Such innovative options for providing incentives to landowners are required to diversify the options currently available and to unlock access to prime wetlands mitigation sites.

- *Conservation Easements*

A conservation easement is a restriction placed on a piece of property to protect its associated resources¹¹. This concept has been applied extensively in the United States. The easement is either voluntarily donated or sold by the landowner and constitutes a legally binding agreement that limits certain types of uses or prevents development from taking place on the land in perpetuity while the land remains in private hands.

¹¹ The information in the discussion regarding conservation easements was sourced from: <http://www.nature.org/aboutus/howwework/conservationmethods/privatelands/conservationeasements/>

Conservation easements protect land for future generations while allowing owners to retain many private property rights and to live on and use their land, at the same time potentially providing them with tax benefits.

In a conservation easement, a landowner voluntarily agrees to sell or donate certain rights associated with his or her property – often the right to subdivide or develop – and a private organisation or public agency agrees to hold the right to enforce the landowner's promise not to exercise those rights. In essence, the rights are forfeited and no longer exist.

An easement selectively targets only those rights necessary to protect specific conservation values, such as water quality or migration routes, and is individually tailored to meet a landowner's needs. Because the land remains in private ownership, with the remainder of the rights intact, an easement property continues to provide economic benefits for the area in the form of jobs, economic activity and property taxes.

A conservation easement is legally binding, whether the property is sold or passed on to heirs. Because use is permanently restricted, land subject to a conservation easement may be worth less on the open market than comparable unrestricted and developable parcels. Sometimes conservation easements will enable the landowner to qualify for tax benefits in compliance with Internal Revenue Service rules in the USA.

Before setting the terms of an easement, a scientific assessment of the land and its natural resources is conducted to determine the conservation objectives for the land in the context of the larger landscape and prepares a baseline report documenting the condition of the land. Easement terms should also include a plan for monitoring the property to ensure that the conservation goals will be met in future and the easement terms will be enforced.

Voluntary easements are very similar to our stewardship programmes where agreements are entered into to conserve sections of private property with varying levels of conservation value. The conservation agencies are responsible for baseline assessments, developing a management plan and monitoring and enforcing the terms of the agreement.

In the United States, most easement transactions have been donated easements. The purchase of easements generally only takes place in high-priority sites where circumstances are such that a landowner cannot use the tax benefits of a donated easement and where funds can be identified and secured for the purchase. Purchasing easements costs less than purchasing the land itself. As in the USA, there are landowners in South Africa who volunteer their property for some form of stewardship arrangement. It is those instances where they cannot afford to donate the land that funds are required to purchase the easement.

Increasingly, states and communities in the USA are buying conservation easements by turning to purchase-of-development rights (PDRs) programs. In a PDR program, public funds are used to purchase the land's development rights, in effect creating a conservation easement on the land while the land remains in private ownership. The most common financing mechanisms at the state level for PDR programs have been annual appropriations, dedicated lottery revenues, and bonds authorized by the legislature or a voter referendum.

9.2.3.7 Conclusions

According to the New South Wales conservation agency (2006), a successful strategy for conserving biodiversity in productive landscapes, will use a combination of tools to deliver its objectives. The appropriate tool or mechanism will depend on:

- The nature of the land - does it warrant formally protected status, or is it a property that harbours biodiversity with lesser conservation value that does not qualify for full protected areas status.

- The number of land-owner/s. Is it a collective of landowners, in which case a 'protected environment' is likely to be the most appropriate mechanism to apply.
- The needs, attitude and financial position of the land-owner. Can the landowner afford to donate the land in the form of an easement and forego the potential income from the existing development rights? If compensation is required, will a tax rebate be adequate or will the landowner need to be compensated for the foregone opportunities and income?

Of the options discussed, the application of a directive under CARA would not appear to be feasible given due mainly to a lack of capacity to apply, monitor and enforce. It is contended that if this option was viable it would have been applied by this stage given that it has been available and investigated for some time now.

Proclamation of a property as a 'Nature Reserve' is unlikely to be suitable in the case of wetland rehabilitation on private land. Firstly, few properties are likely to warrant full protected area status. In the case of wetland rehabilitation, the aim is to secure rehabilitated wetlands (and necessary buffers) within the property – not an entire property as is likely in the case of a 'Nature Reserve'. In addition, the restrictions on land use are fairly stringent and the administrative process requires a proclamation by the MEC in addition to an agreement with the provincial conservation agency.

The other option provided for under the PAA i.e. a protected environment, appears to be more appropriate to an area that involves several landowners.

The conservation agreement appears to provide a flexible option that is neither too restrictive but still provides for long term security with the option to attach the biodiversity management agreement and land use plan to the title deed, or for the surveyed area of the property to be registered as a 'conservation servitude'. This would not provide a full proof guarantee provided by a nature reserve. However, it should also be noted that once a wetland has been rehabilitated the landowner requires authorisation under the EIA regulations, the NWA, MPRDA and CARA to undertake most of the activities that are likely to impact either directly or indirectly on the wetland such as mining, dams, afforestation and cultivation of virgin land in the wetland catchment. Resorting to legal action based on the landowner breaking the contract held between themselves and the conservation agency is the first point of reference. However the various legal permitting and authorisation processes provide another level of protection for a wetland once rehabilitated.

Despite its potential to meet this fundamental requirement in a mitigation banking system, conservation agreements have several potential limitations. Dedicated capacity is required within the provincial conservation agencies to manage or undertake the various aspects necessary to give effect to this mechanism i.e. the BMA, Management plan and activities required to establish these such as the need to survey the conservation area. Currently there is a national Stewardship Programme and the conservation agencies in the Western Cape and KwaZulu-Natal have stewardship programmes or units with dedicated. These provinces have developed pro-forma contracts and agreements and are at different stages of developing conservation agreements with a growing number of landowners. To date the development of stewardship at a provincial level has been optional. Under the National Biodiversity Framework for South Africa being developed by DEAT, stewardship will become a requirement for all conservation agencies against which they will need to report progress. This requirement in conjunction with the support currently provided by the national programme and the botanical society to provinces is likely to stimulate the development of the necessary capacity in provinces other than the Western Cape and KwaZulu-Natal. Currently however, it does not exist.

It is also likely that in certain cases, either the state and/or size of the wetlands may not warrant the effort necessary on the part of the conservation agency to develop a conservation agreement.

The contracts developed by WfW would be more appropriate in such instances as the process is less onerous and is not necessarily dependant on a particular level of biodiversity value. While this is an advantage, the contractual relationship is not binding on future landowners. Addressing this significant limitation would be important and may be achieved by surveying the wetland, establishing it as conservation servitude attached to the title deed.

It would therefore appear that we have the mechanisms in South Africa to establish agreements that secure wetland mitigation efforts on private land in the long term; they now need to be tested.

What is lacking is the financial incentives necessary to obtain agreement from landowners who can not afford to donate wetlands as mitigation sites. Mechanisms concerned with payment for ecological services are mainly work in progress and are in their infancy. What is required is a fund or budget located within a government agency - WfW would be the most appropriate home in the case of wetlands, for purchasing development rights and or paying landowners out for foregone income resulting from extracting wetlands from production.

9.2.4 Timing of Credit Withdrawal and Bank Failure

The issue as it stands in the USA

“As many as 92% of the nation’s banks allow credits to be withdrawn from the mitigation bank in advance of maturity. On average, banks allow for the advance debiting of 66 percent of credits prior to attaining final performance criteria and 42 percent of credits prior to achieving any performance criteria.” Performance criteria are a set of characteristics (measurable or observable) that are used to evaluate whether an ecologically viable wetland was created in accordance with the conditions set forth in the initial authorisation of the bank. It is the duty of the Corps to evaluate whether or not a bank is “successful.” Wetland creation and restoration projects take a considerable amount of time and initial capital to set up. Functional properties of wetlands take even longer to develop. Bank sponsors therefore assert that it is absolutely necessary to be able to sell credits prior to overall project success.

The EPA is sympathetic with sponsors, realizing that if the bank is allowed to sell a small percentage of credits early, there will be an incentive to continue improvements and achieve overall success. The *Federal Guidance* document allows advance debiting and does not limit the percentage of credits that may be sold prior to performance standards being met and the practice of “advance debiting” is common across America.

The EPA and Army Corps view on advanced debiting is that, within reason, the process does not hinder the overall success of the bank or the role of banks in compensatory mitigation. If a bank sponsor has begun earth moving, species introduction, hydrologic improvement or other beneficial processes, then the environment has benefited. According to the Corp’s Institute for Water Resources, many of the early banks had deficiencies in implementation or in designated long-term management programs. Nevertheless, the majority of the banks were functioning, or were expected to function, as planned. Not surprising, the most common reason for failure was improper design or engineering of hydrology.

It therefore seems that advance debiting is a necessity for mitigation banks to be financially viable in the USA. The process is not without risk, which is why legal measures are taken to ensure the long-term commitment of the bank sponsor to reach completion. In addition, financial assurances are required as a banking instrument at the outset of the bank set up, just in case the bank fails to reach maturity.

The new rule proposed by the Corps and EPA (March 2006) aims to address some of the risks associated with advance debiting by requiring that a credit release schedule be developed that links credit release to specific milestones (performance standards). If these are not met, then regulatory authority may

- Modify the schedule.
- Reduce the number of credits available, or
- Suspend the credit sales altogether.

Furthermore, the Corps proposes release of credits against this schedule only when:

- The banking instrument and mitigation plan have been approved,
- The mitigation bank site has been secured.
- Appropriate financial assurances have been established.

The issue in the South African context

This issue is one of risk. Due to the unavoidable delay between rehabilitation works and the response of wetlands in terms of developing functional properties, it is a risk that can not totally be avoided. It can however be minimized by applying one or more of the following principles and or measures:

- Only considering rehabilitation and restoration as methods of compensatory mitigation in South Africa (As discussed previously the risk of failure is higher in the case of creation and protection does not actually offset loss in area of wetland).
- Applying the precautionary principles in determining mitigation ratios and applying a ratio of 2:1 (or higher) as a minimum, rather than 1:1 which appears to be the minimum in the USA.

As discussed when considering this issue in the USA, one of the greatest drivers of advance debiting (selling credits in advance of them being realized) is the need to ensure financial viability of the bank. Banks can not wait five or more years before they start to earn an income, as they need to meet operational costs and pay the financing institution.

Apart from increasing the minimum compensation ratio and limiting the wetland creation as a mitigation measure, any mitigation banking model developed in South Africa needs to be designed to limit the demand to sell credits before they are realised.

9.2.5 Capacity and Enforcement

The issue as it stands in the USA

Implementing OSM or Mitigation Banking requires adequate technical capacity to map, assess impacted and mitigation sites, as well as to plan rehabilitation measures, implement them and monitor success. A level of capacity is required both within regulatory authorities, as well as the scientific community and consulting organisations.

Similarly sufficient capacity is necessary to monitor and enforce compliance. The lack of adequate capacity to monitor early mitigation efforts in the USA was one of the key drivers for moving from project specific mitigation to mitigation banks. To a degree banks overcome this issue because it is easier to monitor large consolidated bank areas than a multitude of individual sites managed by a larger number of bankers.

The issue in the South African Context

While the pool of suitably qualified wetlands ecologists in South Africa is growing, it is still relatively small. The lack of consultants with the skills and experience to properly delineate and apply assessment tools such as Wet-Assess and Wet-Health is a major issue as confirmed by Anton Linstrom, (*pers comm.*), an aquatic ecologist with Mpumalanga Tourism and Parks Agency (MPTA) and Dr Donovan Kotze (co-author of this report). Both these experienced ecologists have reviewed various wetland specialist reports and found many to be poor in quality

with the identification and delineation of wetlands not being properly undertaken. While the lack of quality is related in some degree to the fact that several of these tools are new, it is primarily due to there being little control over the consulting field where there is a lack of certification and developers often contract the consultant with the lowest price.

Delineation and assessment of the impacted site is the first step in the process of establishing the impact, from where appropriate mitigation measures can then be developed. There are various institutions (Universities) and organisations (Mondi Wetland Project) that offer training in various aspects of wetland ecology and management. Accreditation of government staff and consultants via these courses would assist in addressing this need. The courses themselves would need to meet certain standards to be recognised as appropriate. Accreditation of wetland ecologists, both within the consulting field as well as in industry and government will assist in raising both the standard and number of qualified people able to competently delineate and assess wetlands impacts.

Planning and setting up a wetland bank requires detailed spatial and attribute information that accurately indicates the location, type and status of wetlands in a catchment. Whitten *et al.* (2002) acknowledges the development of 'A Directory of Important Wetlands in Australia' as a helpful start, but notes that knowledge of wetland resources remains very poor for large parts of Australia, and that this is a serious gap in Australia's planning framework which needs to be addressed urgently. The situation in South Africa is similar. The State (SANBI) has recently completed the national wetlands coverage. This national coverage is a start but is not at a scale or resolution appropriate for detailed planning at a catchment scale. There are very few catchments in the country where a level of inventory is available to facilitate planning a mitigation bank. Refinement of the spatial location and collation of attribute information to make this coverage more useful at a provincial and catchment scale should be prioritised by other government bodies such as DWAF, catchment management agencies and the provincial conservation organisations that are mandated with the protection of water resources and conservation of biodiversity respectively. The development of an inventory at a resolution that enables effective catchment planning can be time consuming and costly. Combining resources of various departments, agencies as well as the private sector would assist in addressing this issue. The development of an inventory and catchment management strategy for wetlands in the Upper Olifants River Catchment is a good example of such collaboration. The work was undertaken by consultants and jointly funded by DWAF and Coaltech. The project steering committee included representation and technical input from among others DME, the provincial conservation authority and the NGBP. These outcomes of this project will assist all of the role players in meeting their mandates and this formed the basis for the collaborative approach.

The capacity related to wetland rehabilitation in South Africa is significantly aided by the activities of the WfW programme, who use a group of consultants at each stage in their project cycle, from planning to implementation, monitoring and auditing. The capacity and experience of these consultants is increasing with each project cycle. In 2001 there were 219 banks in the USA, all of which have differing levels of expertise. A banking model that involves WfW playing the implementation role, will avoid the need to regulate a wide range of different banks and the associated range of skills.

So while there are definitely capacity constraints within South Africa, there is a core of appropriate capacity which includes the WfW network of consultants and associated agencies which has good experience. Furthermore, the imminent finalisation of the Water Research Commission WRC study on wetland rehabilitation will contribute significantly to the knowledge, tools and understanding in this field.

9.3 Summary of Key Issues and Options for Addressing these in South Africa

Analysis of the situation and lessons learned from the USA allows us to

- Identify the technical tools legislation and any other requirements necessary to implement mitigation banking (summarised in Table 9.6).
- Identify the technical and institutional/legal issues that have drawn criticism of the concept in the USA, and consider if and how these may be addressed in South Africa given the local context (institutional structure, tools). The key technical and institutional/legislative issues discussed in this section and the possible options for addressing these are summarised in Table 9.7.

Table 9.6 Key requirements for applying the concept of mitigation banks and the ease/difficulty with which these are likely to be met in South Africa

KEY REQUIREMENTS	THE EASE/DIFFICULTY WITH WHICH THE REQUIREMENTS ARE LIKELY TO BE MET
Statutory requirements	
Sound legislation supporting the concept of “avoid, minimize and mitigate”, and holding developers accountable for compliance with Records of Decision.	This legislation already exists, principally within NEMA, CARA and the National Water Act, and is considered adequate.
Sound legislation accounting for the specific requirements of wetlands (e.g. a legally defensible definition of wetlands).	This legislation and or guidelines exist, and although perhaps requiring some refinement, are considered to be generally adequate. ▪ Definition of a wetland – National Water Act ▪ DWAF Delineation guidelines (DWAF, 2005)
Sound legislation specifically tailored to enable the effective administration of mitigation banks.	Several legal mechanisms are available within existing statutes that could be applied to address certain requirements of establishing and operating a bank. For example the NEMA Biodiversity Act provides for management agreements to conserve threatened ecosystems – this could be used in meeting the need to secure rehabilitation sites. The National Water Act also provides for the establishment of bodies necessary for administering integrated water resource management. Specific policy and legislation for other aspects of developing and operating a bank need to be developed – such as guidelines developed in the Western Cape to govern Biodiversity Offsets in general. Such an instrument would cover issues such as bank size, service area etc. What is also lacking is the capacity to administer such a mechanism.
Institutional Requirements	
Effective enforcement of the relevant legislation	Inadequate resources and limited capacity are recognized as important limitations of the current situation.
A lead organisation to oversee the mitigation banking process at a national level	Working for Wetlands is ideally placed to carry out this function and has already stated in its strategy of 2005 that it intends to “Encourage wetland rehabilitation efforts beyond the Working for Wetlands projects by, for example, providing tools, guidelines and standards, quality control criteria and planning techniques to support other rehabilitation efforts, and advocate the wider use of off-site mitigation, where appropriate.” and “Provide a service as third party verifier for off-site mitigation projects”.
Institutions for multi-stakeholder coordination and collaboration.	Useful entities already exist at national level in the form of the National Wetland Indaba and the wetland list server, and at provincial level in the form of the Provincial Wetland Fora. As the CMAs and their associated institutions form, they are also likely to become useful.

	A specific MOU that defines the roles and responsibilities of those organs of state and other stakeholders specific to a province or region that would have a role to play in overseeing the establishment and operation of a mitigation bank needs to be developed. The development, co-ordination and maintenance of such an MOU will: ▪ Require a strong lead organisation ▪ Require adequate capacity to operate and maintain participation by members. ▪ Need to be structured in a way that ensures that participation by members assists in them meeting their mandate i.e. there is incentive for involvement.
Technical requirements	
Technical tools ▪ Guidelines/tools for assessing health and functionality ▪ Guidelines/tools for determining credits/ replacement ratios ▪ Guidelines for rehabilitation planning ▪ Guidelines for rehabilitation (construction) ▪ Guidelines/tools for monitoring success (structural and biological - vegetation and others)	Most of the required tools already exist ▪ (WET-Health (Macfarlane <i>et al.</i>, 2006) and WET-Ecoservices (Kotze <i>et al.</i>, 2005) ▪ Need to be developed. ▪ WET-RehabPlan (Marneweck <i>et al.</i>, 2005) ▪ WET-RehabMethods (Russell <i>et al.</i>, 2005) ▪ WET-RehabEvaluate (Cowden <i>et al.</i>, 2005)
Knowledge and expertise of those planning and overseeing the process	Reasonable existing knowledge and expertise on wetland rehabilitation resides within a network of organisations, notably WfWetlands and Mondi Wetlands Project, consultants and universities, and this continues to be enhanced through experience and the WRC WfWetlands wetland rehabilitation research programme. Specific expertise around administering mitigation banks and monitoring and evaluating mitigation is, however, limited but is being developed (e.g. through this project).
Knowledge and expertise of those implementing the mitigation measures	Numerous Section 21 companies have been established to implement wetland rehabilitation on behalf of Working for Wetlands. Although specific areas require improvement (e.g. re-vegetation techniques), a significant pool of knowledge and expertise has been built through their years of experience and the training, mentoring and monitoring and evaluation provided to these companies by WfWetlands and its partners (e.g. Mondi Wetlands Project).

Table 9.7 Summary of issues associated with mitigation banking and options for addressing these in South Africa.

TECHNICAL ISSUES	RECOMMENDATIONS TO ADDRESS THE ISSUE IN SOUTH AFRICA
Wetland definition and guidelines for delineation	The existing NWA wetland definition and DWAF guidelines for wetland delineation should be used.
On-site vs off-site and in-kind vs out of-kind	The principle of on-site and in-kind should be applied as far as is practically possible. However, off-site mitigation could be considered acceptable where impacts are unavoidable, the impacted wetland is not considered irreplaceable and no opportunities exist for on-site mitigation. For off-site mitigation, replacement should be in-kind unless data exists to demonstrate that the site chosen is of kind that is rarer and/or more threatened than that being lost. The provincial biodiversity conservation agency and provincial biodiversity conservation plan should be referred to for guidance in identifying rare/threatened wetland types.
Size of mitigation banks	As far as is practically possible, banks should be relatively large but with due consideration taken of the existing size distribution of wetlands in the region.
Geographic service area	The principle means of designating the geographical service area should be based on a joint consideration of catchments and bioregions as specified in region conservation planning and catchment management plans where they exist.
Transfer of ecosystem services from one area to another	This issue has particular relevance to South Africa, which has a history of inequality. As would be the case around the issue of magnitude of impact and avoidability, any offsite mitigation would need to be preceded by a full assessment of impacts (i.e. off-site mitigation should never become a means of avoiding the standard regulatory requirements facing any development).
Different types of compensatory mitigation	Rehabilitation should be the principle means of carrying out mitigation although judicious application of enhancement, protection and creation are also considered acceptable. However, it must be stressed that there is very limited experience in wetland creation in South Africa.
Determining credits and debits	WET-Health and WET-Ecoservices can be used for determining credits and debits.
Replacement ratios	Replacement ratios must ensure that in any mitigation project, credits must exceed debits, and that due consideration is taken of other relevant factors (e.g. if risks of failure are high then the replacement ratio should be increased accordingly). A tool needs to be developed to assist in the systematic determination of replacement ratios based on these multiple considerations.
Dealing with the risks of failure	Rehabilitation credits should only be withdrawn when they are fairly advanced in terms of re-instatement of functions, and rehabilitation methods should be chosen that are largely self-sustaining rather than requiring frequent maintenance. In addition, banks should be well protected (in perpetuity) through legal means.
LEGAL AND INSTITUTIONAL ISSUES	RECOMMENDATIONS TO ADDRESS THE ISSUE IN SOUTH AFRICA

Appropriate policy and legislation	While SA does not have specific policy or legislation designated specifically to wetland management and conservation, the existing legislation is considered adequate to require and enforce mitigation of unavoidable impacts. Additional legislation is therefore not considered necessary. What are required are guidelines as to when the various Acts should be applied in the process of establishing and implementing a mitigation bank. This relates to the co-ordination between relevant departments as discussed below and is elaborated on in the proposed model for mitigation banking discussed in latter sections.
Regulatory and other responsibilities	There are a range of departments and agencies with a mandate to protect and manage wetlands. This situation can be beneficial if clear roles and responsibilities for implementing a mechanism for such a mitigation bank are established. The mechanism should be one that will assist in the various departments meeting their mandate. Similarly, the role they play in administering such a mechanism should also be within their mandate.
Accessing and securing wetlands in perpetuity	Mechanisms exist for securing wetlands in perpetuity. Of these, conservation agreements provided for under NEMBA appear the most appropriate. It provides flexibility to the landowner and considerable security at various levels through different legal mechanisms. What is lacking are financial incentives necessary to access priority mitigation sites where the landowner requires compensation for foregone income or potential income from unutilised development rights. Various innovative ideas are being explored, but presently a direct payment would appear necessary.
Timing of credit withdrawal and bank failure	Various suggestions and factors in SA will reduce the risk of failure: ▪ Applying a conservative mitigation ratio as a minimum ratio e.g. 1:2 or greater (this requires consideration by relevant government departments and agencies). ▪ Applying rehabilitation only, as opposed to wetland creation and protection as the primary mechanism for mitigation. ▪ Using one implementing agency (WfW) with accepted and proven consultants which reduces the risks associated with many different bankers who may use different consultants of varying levels of expertise. ▪ Planning of wetland mitigation by government agencies mandated with conservation and who can draw on necessary expertise avoids the risk of site selection and compensation methods being influenced by financial gain (as is the case in USA). Ideally any banking model in SA should be designed to mitigate in advance of anticipated impacts – thereby allowing time for credits to be established and verified.
Capacity and enforcement	Training and accreditation of wetland ecologists and managers in the application of tools and techniques required to delineate, assess impacts, plan and implement rehabilitation is required. Various universities and other organisations such as the Mondi Wetlands Project provide courses worthy of accreditation that should be recognised by government. The WfW programme uses a range of specialist consultants in the different steps of the rehabilitation project cycle. They have proven skills and experience. Financial and technical resources are required to develop wetland inventories in priority catchments – this information forms the basis for detailed planning and identification of thresholds for protection and key mitigation sites. This information is necessary for an effective banking model to be instituted and establishing it is one of the first steps in planning banks. The collection and development of this information falls within the mandate of several government departments. The example of the Upper Olifants River Catchment illustrates how relevant public (government departments and agencies) and private role-players (coal industry) have effectively combined to address this requirement.

From Table 9.6 and 9.7 it is evident that many of the legal requirements and technical ability necessary for developing mitigation banks are met in South Africa. The challenge lies in:

- Establishing finance for various inputs.
- Arriving at a suitable institutional set up.
- Co-ordinating the relevant institutions and
- Administering the process as a whole.

These issues have been considered in the selection of the proposed mitigation banking model outlined in the following section and the demonstration sites and projects selected for piloting the model.

10. PROPOSED MITIGATION BANKING MODEL FOR SOUTH AFRICA

10.1 Overview of a Banking Model

A mitigation banking model for South Africa is proposed in this section. In general the approach taken has been to design the model around the existing institutional structure, available capacity and programmes i.e. to combine and align available and existing elements and thereby avoid creating something completely new in a country where government and society in general are already challenged with meeting the requirements of existing law, structures and concepts. The model has therefore been designed to correspond to the legal, policy and institutional framework in the country. It also attempts to account for local issues such as limitations in institutional capacity within the government departments that will play a role in the banking process.

Importantly the model is designed to overcome the various shortcomings of the model as practised in the USA. The significance of these limitations is reflected in the ongoing criticism still levelled at the concept after 15 years of application and the decision of Canadian authorities not to consider applying the concept in their country.

As discussed in Section 8.1, Canada has adopted an approach to compensatory mitigation for wetland impacts where the State plays a central role in planning and implementing off-site mitigation activities, as in the State of Alberta where a wetland restoration agency has been established which operates very much like the Working for Wetlands programme in South Africa. The proposed model for the local situation is similar to the Alberta example as it is centred on the WfW programme. While the Alberta model includes elements of a bank in its planning, it is not a banking model in the true sense because credits are not generated in advance of anticipated losses. This negates several of the key benefits of a bank.

The model proposed for the South African situation attempts to maximise the benefits of a banking system while avoiding the limitations by the state playing a far greater role. Consequently it can not be considered a market mechanism per se, but the structure is considered prudent in light of the understanding generated in this study, and appropriate given the existence and operation of the WfW programme. The model is presented and explained by providing:

- An overview of the proposed mechanism.
- A step by step description of the process which describes the activities within each step, the tools and data required to take these actions and the responsibilities of different role players in each step.
- A schematic summary of the banking process and its relationship with the EIA process

The section concludes with a summary of how the model addresses the issues identified in the USA experience, how it fits within the legal framework and lastly, the potential for benefiting the various role-players.

WfW will generate credits through its current mandate and activities i.e. wetland rehabilitation. As the programme pays for the credits, they will own them and act as the banker. As the banker, WfW will also be responsible for the maintenance of credits in the long term.

While WfW will play a central role, other government departments will have key responsibilities at various stages in the model to ensure that bank is established and operated within the legal framework. The role-players and their responsibilities are summarised in Table 10.1. The success of the banking model requires the effective input of the various government departments who will form part of what is termed the Mitigation Bank Management Unit (MBMU). A Memorandum of Understanding (MOU) will be required to define the roles and responsibilities of the MBMU members. A generic MOU may be developed at a national level and adapted to the different institutional arrangements at a provincial level. The relevant departments and agencies are listed in Table 10.1.

Table 10.1 Summary of role players in the proposed mitigation banking model

ORGANISATION/Institution	ROLE & RESPONSIBILITIES
SANBI/Working for Wetlands	Implementing/Lead Agent • Prioritising catchments • Identifying rehabilitation sites • Negotiating with landowners • Planning rehabilitation • Implementing rehabilitation • Monitoring rehabilitation Banker • Pay for establishing credits • Manage bank ledger.
Government departments/agencies • Dept of Water Affairs and Forestry (DWAF) • Catchment management Agency (CMA) • Department of Minerals and Energy (DME) • Provincial Conservation Agencies (PCA) • Department of Environmental Affairs & Tourism (relevant authority at a provincial level) • National Department of Agriculture (NDA)	Mitigation Bank Management Unit - Technical & Financial Assistance • Support to WfW through provision of technical, financial, institutional or legal support to facilitate functioning of the bank. • Responsibilities and involvement defined in inter-agency agreement (memorandum of understanding). Application of relevant legislation at points identified in process to ensure that: • Impacts are unavoidable through EIA & other licensing processes. • Mitigation measures are entrenched in conditions for approval of unavoidable impacts. • Implementation of conditions (mitigation) is enforced.
Bank Clients (Companies, or Individuals)	Bank Clients • Purchasing credits to offset unavoidable impacts to wetlands • Purchase of wetland credits as commitment to society/biodiversity. • Purchase of wetland credits as a means of
Landowners Rehabilitation can be undertaken land under different types of tenure & landowners can therefore either be: • private, • communities or • the state.	Management of Mitigation Sites • Manage land and mitigation sites in terms of legal agreements established to secure mitigation in long term Beneficiaries • Benefit from direct financial compensation for foregoing development rights and or existing use of mitigation site, and/or • Receive potential benefits associated with signing and adhering to certain management agreement, such as: ▪ Priority attention from state programmes such

	as working for water, and ■ Exemption from taxes upon sale of property. ■ Payment for ecological services – for example, through reduced water charges as compensation for contributing to the enhancement and protection of ecological services performed by the rehabilitated system.
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10.2 Bank Planning

This section lists and describes the actions necessary to establish a mitigation bank. It summarises the actions to be undertaken, the tools and data required for each of these actions as well as the role players involved in each step and their respective responsibilities.

1. Prioritise Catchments for Establishing Mitigation Banks

Description

The WfW programme operates in catchments all over the country and generates ‘credits’ through wetland rehabilitation. A mitigation bank can therefore effectively be established wherever WfW operates. Furthermore, it is likely that in most catchments there will be development activities which result in unavoidable impacts that can be offset through the purchase of credits established by WfW. It is however considered important to prioritise in which catchments banks are established for the following reasons.

Mitigation banks provide a mechanism for efficiently offsetting residual impacts identified at the culmination of the avoid-minimise-mitigate decision hierarchy applied in EIA and Water-use license application processes. The usefulness of a bank to decision makers and developers is therefore greater where the demand to develop wetlands is high i.e. where there is a sector that impacts wetlands and there is projected growth in that sector in a catchment.

More importantly, there are various steps undertaken in planning a mitigation bank which provide information that improves decision making at a strategic/catchment level - something that is not possible at the project specific EIA level. These steps include setting the ecological reserve and setting management priorities for wetlands in the catchment. The usefulness of this strategic information and planning is greater in catchments which are degraded or stressed¹² and under development pressure.

Priority for establishing a bank should be allocated to catchments where:

- Development pressure on resources in the catchment is high, and
- The water resources are degraded and stressed.

Tools/Data

- National wetland inventory – will assist in identifying priority wetland areas at a broad (national/provincial) level.
- Demand for credits (pressure on wetlands) as indicated by the number of development applications for authorisation in terms of the following Acts:
 - Water Use licences under NWA,
 - Mining permits under MPRDA.
 - EIA applications under NEMA for activities impacting wetlands.
 - Applications to drain/infill wetlands under CARA.
- The state of the catchment, identified through :
 - Internal strategic perspectives (ISP).

¹² Stressed catchments are those where the water quality does not meet standards and demand exceeds supply.

- Ecological reserve – which identifies the present ecological state (PES) and sets ecological management categories (EMC) for resources.
- Provincial conservation plans – used to identify catchments with high conservation value (those conservation plans where the biodiversity plan includes an aquatic component will be more useful).

Responsibility

Working for Wetlands (overall responsibility) with support from:

- DWAF – to assist in the identification of stressed catchments and their status by providing and analysing ISPs, water use license applications, reserve information.
- DEAT (relevant provincial department) – analysis of EIA applications for activities impacting wetlands.
- DME – mining license applications where the nature of the mining impacts wetlands.
- NDA – applications under CARA to drain or infill wetlands.
- Provincial Conservation Agencies – analysis of provincial conservation plans and specific wetland information to identify highly threatened catchments with regards to biodiversity.
- Provincial Wetland Fora – input from civil society, industry and local government.

Given that several of the departments or agencies that comprise the MBMU are provincial agencies or departments, it makes sense from an administrative point of view to prioritise catchments at a provincial scale.

2. Determine the Ecological Reserve for Water Resources in Priority Catchments

Description

The Ecological Reserve (ER) is determined according to the requirements of Section 3 of the National Water Act (NWA). Determining the ER for a water resource (river or wetland) involves defining the Present Ecological State (PES), the ecological importance and sensitivity (EIS) and the ecological management category (EMC) of a water resource. The EMC effectively acts as target that guides management actions for the resource. Resource quality objectives (RQOs) need to be set that must be adhered to in order for the EMC for a resource to be achieved. While the methodology for establishing the reserve for rivers has been developed and applied, this is not the case for wetlands. Because wetlands are linked to and influence the state of river resources, determining the reserve for individual wetlands in a catchment would require that EMC for the rivers within a catchment act are considered. Ideally, the ER for rivers in a catchment should be established as this will inform the establishment of management objectives for wetlands in a catchment. Setting the ER is therefore a necessary element in the process of establishing a mitigation bank.

Tools/data

Protocols and tools for determining the ecological reserve (these exist for rivers, but are still under development in the case of wetlands).

Responsibility

The Resource Directed Measures Directorate within DWAF is responsible for prioritising and managing the determination of reserve studies.

3. Establish a Wetland Inventory for Priority Catchments

Description

The recently completed national wetland inventory provides a broad overview of the distribution of wetlands at a national level but is not at a resolution that allows for detailed analysis of

wetland type, function and status at a catchment or sub-catchment level. More detailed inventories have been undertaken on an ad hoc basis in response to different needs across the country. The approach to and methods undertaken for these specific inventories are however not standard. Consequently the resolution of the spatial data and type and detail of the attribute information varies significantly.

In order to relate the status of wetlands in a catchment to the ecological reserve, it is necessary to establish a wetland inventory at a resolution that allows for:

- Classification of wetland type according to standard/national classification system (under development).
- Establishes the PES (Table 10.2) of wetlands according by applying the available tools (WET Health & WET Ecoservices) at a minimum of a desktop level.
- The existing contribution or potential of each wetland in the catchment to contribute to meeting the requirements of the ER.

Table 10.2 Present Ecological status categories for wetlands (Kleynhans 1999)

ECOLOGICAL CATEGORY	DESCRIPTION
A	Unmodified, natural.
B	Largely natural with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged.
C	Moderately modified. Loss and change of natural habitat and biota may have occurred, but the basic ecosystem functions are still predominantly unchanged.
D	Largely modified. A large loss of natural habitat, biota and basic ecosystem functions has occurred.
E	Seriously modified. The loss of natural habitat, biota and basic ecosystem functions is extensive.
F	Critically modified. Modifications have reached a critical level and the lotic system has been modified completely with an almost complete loss of natural habitat and biota. In the worst instances the basic ecosystem functions have been destroyed and the changes are irreversible.

Tools/Data

- Aerial photography.
- Wetland classification system (under development by SANBI)
- WET-Eco-services, WET-Health – used to determine PES.
- Conservation planning data
- Guidelines and regulations for developing an inventory that sets methods and standards for establishing a wetland inventory (to be developed).
- Technology (nature and type will be dictated by the adopted method and standards).

Responsibility

It is necessary to develop standards and guidelines for establishing a wetland inventory that meets the requirements discussed above. It is proposed that WfW take responsible for overseeing the development of these standards and guidelines with input from different members of the MBMU and specialists (academic and/or consultants). Different members of the MBMU will have different uses for an inventory which will demand varying levels and types of information to be collected. For example, provincial conservation plans do not include information at a high enough resolution to inform catchment level planning. Conservation agencies therefore require that the guidelines for establishing an inventory include detailed information relating to the biodiversity of wetlands.

The development of inventories themselves should be undertaken by suitably qualified consultants that have the expertise and experience to map and establish the PES and contribution of wetlands to the ER (WET-health and WET-Ecosystems). The different members of the MBMU may provide financial and technical input necessary to ensure the inventory meets the required standards and serves its purposes.

4. Set Management Priorities for Wetlands in Priority Catchments

Description

There is a concern that mitigation banks provide an easy solution to overcome challenging decisions associated with development applications and may result in the 'avoid, minimise-mitigate' decision making process being short circuited to the 'mitigate' option. To avoid this, it is important, if not essential to have set catchments priorities prior to considering development applications. These priorities need to establish:

- Those wetlands systems or types considered irreplaceable – due to their conservation and /or functional value they should not be developed at all.
- Management actions for wetlands – whether a wetland must be conserved or rehabilitated to meet the EMC set in the Ecological Reserve and biodiversity targets for the province.

Linking the catchment priorities to the ER and including them in a catchment management strategy gives them legal standing that will support decisions associated with applications under NEMA EIA regulations, water use license applications under Section 21 of the NWA, or mining activities under the MPRDA.

The result of this step will be management objectives for:

- Specific wetland types. For example where a particular wetland with high biodiversity value has been degraded below targets e.g. less than the minimum percentage necessary to retain a representative sample of that habitat, then the objective would be to prevent any further development of this wetland type.
- Specific quaternary catchments. For example, where the PES of a quaternary catchment was determined to be an E and the EMC a C, then wetlands in the catchment need to be managed to work towards that target i.e. degraded systems to be rehabilitated and pristine wetlands protected.
- Specific systems. This would be based on the existing contribution of the wetland to the ER, or its potential to contribute to the ER i.e. where a wetland is degraded but is a wetland type particularly suited to performing a certain function e.g. water purification, in a catchment where water quality is poor and needs to be improved to achieve the requirements of the ER.

The full suite of resource directed measures including those for determining the EMC for wetlands are yet to be finalised¹³. Until such time as they are, the prioritisation of wetland management actions should be based on the contribution that the wetlands make towards the achievement of the ecological specifications and the overall Recommended Ecological Category of the sub-catchment (Oryx Environmental, 2007).

The guidelines for including wetlands in catchment management provides guidelines for using the available information (Ecological Reserve, Wetland PES and functional value, Conservation plans to set management objectives.

¹³ This process can be implemented in a more formal manner and more systematically when the National Water Resource Classification System (NWRCS) is implemented. The NWRCS will provide a set of guidelines and procedures for determining the desired characteristics of a water resource, as represented by a Management Class. Such Management Classes will be determined in a consultative process with stakeholders, with the

Tools/Data

- Protocols and tools for determining the reserve.
- Inventory
- Ecological Reserve information (PES).
- Resource Quality Objectives and the component EcoSpecs
- Provincial Conservation Plan (ideally the conservation plan should include an aquatic component).
- Protocol and guideline for integrating and analysing information sources to set management objectives.

Responsibility

As the wetland management priorities need to be entrenched in the catchment management strategy (CMS) and developed to meet the requirements of the ER, it is suggested that the responsibility for managing this process and ensuring adherence to the outcomes lies with DWAF (or where in place the CMA) with support from the MBMU, particularly WFW and the provincial conservation agencies.

Other role players in the catchment such as municipalities, wetland forums and key sectors or land-use which impact on water resources (agriculture, industry, tourism, mining etc) and rural communities should also be involved in the process. Their involvement will create an understanding of the status of water resources in the catchment, the legal requirements that need to be met for the catchment, and the implications for them as water users of the management objectives that are set. Where the ER requirements potentially impact a sector by precluding development in a certain sub-catchment, it can encourage/force them to consider alternative/less harmful methods of production or sites that cause less impact to water resources.

The agreed priorities, targets and methods for attaining these should be signed off by DWAF/CMA and included in CMS.

5. Identify Bank Sites and Secure Landowner Agreement

Description

Activities in the previous step will identify where (sub-catchments) and in which wetlands rehabilitation efforts are required to meet requirements of the ER. Consideration of this information in conjunction with cadastral information and other criteria applied by WfW in their planning process will allow them to identify and prioritise specific bank sites within the catchment.

Having identified bank sites, WfW will engage landowners as per their current modus operandi to determine:

- Whether a landowner will agree to rehabilitation of wetlands on their property, and the basis for agreement. Landowners may voluntarily make the wetland available, or they may require financial compensation if the wetland is generating income e.g. where it has been drained and converted to pastures.
- The legal instrument that would be appropriate in each case for securing the mitigation site in the long term. As concluded in section 9.2.3 it is proposed that the following two instruments would be appropriate at this point in time:
 - i) Protected Area
For this instrument to be appropriate, the rehabilitated wetland will need to be of sufficient size and potential conservation importance to warrant the relevant provincial conservation agency applying this mechanism.
 - ii) Biodiversity Management Agreement

As in the case of the protected area option, the mitigation site and buffer area would need to hold a level of biodiversity value that warranted this mechanism being applied.

ii) Contract between WfW and the Landowner

Where the nature of the rehabilitation site and/or tenure system makes a BMA inappropriate, it is proposed that contract law be used as the legal instrument. WfW is currently developing such contracts. As discussed in section 9.2.3, the security provided by such a contract would be enhanced by linking the conditions of the contract to the property rather than the owner at the time so that it is binding on successive owners. An option would be to survey the wetland and register it as a conservation servitude, or have the conditions of the agreement attached to or written into the title deed of the property. These options require further exploration with landowners during the pilot study.

Additional investigation needs to be undertaken to broaden the scope of financial incentives available for securing landowner agreement to rehabilitation on private property, such as the concept of payment for ecological services (PES) which provides an innovative way for establishing incentives for landowners (section 9.2.3.6).

As WfW fulfils the role of the banker in the proposed model, they will be responsible for financial compensation where required by the landowner to access priority wetland sites. This would be a new responsibility for the WfW programme. It is proposed that this role be managed by WfW setting up a fund to finance such transactions. An initial amount would need to be provided by the programme to finance compensation payments in the first bank service area (catchment) that is set up. It is proposed that when credits are sold that the price of the credit amounts to the full costs of generating and maintaining it. This would include the following costs:

- Financial compensation to landowners where required.
- Identifying and survey of the wetland.
- Rehabilitation planning.
- Cost of setting up legal agreements, surveying the wetland, establishing management plans in the case of BMAs.
- Implementing rehabilitation measures.
- Costs of monitoring and auditing.
- Maintenance requirements.

WfW currently funds the planning, implementation and monitoring and auditing of the rehabilitation efforts. By the bank client pay for the full costs of the credit, not only those which are additional to costs normally covered by WfW, this not only reduces the financial burden WfW and Conservation Agencies (where BMA are set up) for costs associated with setting up credits, but has the potential to increase the value of the fund. This is considered an important benefit to the WfW programme because there will be catchments where rehabilitation of previously degraded wetlands is required to meet objectives of the catchment management strategy, but where there is little demand for further development of wetlands i.e. there are no clients in the catchment who can generate the finance necessary to fund access to priority wetlands in the catchment. The proposed 'mitigation' fund aims to address this requirement. Importantly, the sale of credits not only provides access to priority wetlands, but funds the process of establishing the legal instruments necessary to secure rehabilitated wetlands in the long term. Negotiations with landowners regarding appropriate financial compensation would add a new responsibility to the WfW programme and is likely to require new skills and capacity. It is proposed that the necessary costs for these service providers be included in the price of the credit.

Tools/Data

- Catchment management priorities and wetland inventory established in previous steps are necessary to identify degraded wetlands which constitute candidate rehabilitation sites.
- Cadastral information for the catchment. The wetland inventory should include information regarding the property and landowner. The ability to overlay cadastral boundaries with wetland coverage will assist in the landowner engagement and rehabilitation planning process.
- Criteria and guidelines for setting compensation values (for example, compensation may be set according to market values with assistance of professional valuers, and guided by the Expropriation Act 63 of 1975).

Responsibility

- As the banker, WfW would be responsible for landowner consultation.
- The relevant provincial conservation agency would be involved where a BMA was considered the appropriate legal instrument for securing the mitigation site. While consultants can provide the capacity to undertake various tasks such as developing management plans capacity is required with the conservation agencies to manage the process as a whole, including landowner consultation, commissioning and managing consultants and necessary administrative aspects of the process. Currently, only KwaZulu-Natal and the Western Cape have established and functioning stewardship units.

6. Detailed Planning & Approval of Mitigation

Description

Obtaining landowner commitment provides WfW with the security to invest in rehabilitation planning. This would be undertaken as per their current process which involves surveying the wetland based on which rehabilitation measures (structures etc) would be designed. For the reasons discussed in section 9.1.6 neither wetland creation, nor wetland protection are considered appropriate forms of mitigation in South Africa.

Establishing rehabilitation structures in wetlands requires authorisation in terms of the NEMA EIA regulations and also constitutes a water use in terms of section 21 of the National Water Act. Authorisation is therefore required from DWAF and the provincial department responsible for administering NEMA. DWAF may also provide input and support regarding the technical aspects and design of rehabilitation structures. WfW have been working with DEAT and DWAF to establish processes for such support and securing the necessary authorisation. These processes should be entrenched in the MOU established between the members of the MBMU.

The rehabilitation planning process also involves the development of a schedule for monitoring, auditing and maintaining the rehabilitated wetland for a period considered necessary for the system to return to somewhere near its natural level of functioning. All costs associated with the post construction phase need to be documented and included in the price of the credit. These funds will then be available to WfW to maintain the wetland over the required monitoring and maintenance period.

Tools/Data

- Wetland assessment, rehabilitation planning and monitoring tools (WET-RehabPlan, WET-RehabMethods, WET-RehabEvaluate).
- Consultants/service providers – application of rehabilitation tools.

Responsibility

- WfW – wetland assessment & planning.
- DWAF and DEAT (relevant provincial department) – licensing and authorisation of rehabilitation measures.

10.3 Bank Implementation

7. Implement Mitigation Measures & Establish Credits

Description

Once approved, the planned rehabilitation can be implemented as per the current WfW project process. Establishing the number of credits available in the bank would require that the WET-Health tool be applied in the manner explained in section 9.1.7. This will need to be undertaken by experienced consultants with the expertise and experience necessary to apply this tool effectively. This step will result in the generation and valuation of credits for each site (wetland) in the bank. The price of credits will vary across bank sites depending on various factors. For instance the price of a credit (1 ha of wetland) on property A may be more than on property B because the landowner on property A required financial compensation while landowner B volunteered the site on their property.

At this point the bank ledger can be finalised. The ledger documents the number of credits within the bank and the different price of these credits per property.

Tools/Data

- Delineation guidelines, WET-Health,
- Bank ledger (will need to be developed).

Responsibility

- WfW is responsible for rehabilitation and establishing credit balance.

8. Approval of Bank Balance

Description

Before credits can be purchased from the bank, it necessary for the bank balance to be ‘reviewed’ or audited and thereby check that the rehabilitation works required to generate the anticipated credits have been completed according to specifications.

Tools/Data

- It is proposed that the members of the MBMU listed below undertake a site visit of the completed rehabilitation projects.
- Any deficiencies should be noted and remedial action agreed on and taken.

Responsibility

It is proposed that the following members of the MBMU sign off on the ‘bank balance’ as:

- DWAF – to review structural aspects of rehabilitation measures.
- Provincial conservation agency – to ensure that all biodiversity related objectives have been implemented in rehabilitation.
- DEAT (relevant provincial department) – to ensure that the rehabilitation works have met requirements of the Environmental Management Plan that would accompany the Record of Decision issued in terms of the EIA regulations.

10.4 Bank Operation

9. Purchase of Credits

Description

At this point the bank will be operational and clients may purchase credits. While there may be NGOs, companies or other parties who purchase credits as a contribution to society, the majority of clients will be developers who are required to offset residual impacts as a condition of one or more authorisations or licenses granted by the following departments:

- DWAF – in terms of water use license
- DME – in terms of the MPRDA.
- DEAT (relevant provincial department) - in terms of NEMA EIA regulations.

NEMA requires that where authorisation for an activity is required in terms multiple Acts, that the relevant decision making authorities co-ordinate investigations and decision making to avoid duplication or contrasting conditions of approval. As discussed in section 9.2.2, the MOU between MBMU members must clearly define how the various legal processes will be aligned, at what point the various departments will be involved and what role they will play. In the case of determining wetland impacts and the necessary mitigation measures, co-ordination is particularly important with regard to:

- Ensuring that the assessment of the impact assessment during the EIA is undertaken by qualified and experienced wetland ecologists who have the skills necessary to apply the recently developed tools (WET-Health and WET-Ecoservices).
- Ensuring that all possible on site mitigation options are considered and made a requirement of the EMP before resorting to off-site mitigation options.
- That there is agreement regarding the nature of the mitigation that is required and mitigation ratio to be applied in setting the offset (a tool for developing mitigation ratios still needs to be developed).
- There is clarity on which department or agency will be responsible for monitoring and enforcing the implementation of agreed conditions.

The conditions need to be included in all relevant authorisations.

Once consensus has been reached on the number and the nature of credits (type of wetlands that need to offset the impact) by the relevant authorities, the client purchases the credits from the bank. The bank ledger is amended accordingly and the record of decision can be attached as a reference. The payment is split between:

- Costs required to monitor, audit and maintain the credit in the long term (as specified in the rehabilitation planning). This proportion of the payment is kept in a separate account and drawn down by WfW as required over the period necessary for the wetland to 'rehabilitate'.
- Costs incurred in generating the credit. This portion of the payment is retained in the 'mitigation fund' set up by WfW and used to access and secure priority sites in other catchments.

Tools/Data

- Credit ledger
- MOU – clearly defining how to achieve co-ordination between relevant departments and alignment of relevant legal processes.
- Legislation to adhered to in the process:
 - NEMA Principles
 - NWA Section 21 applications
 - EIA regulations
 - MPRDA (in case of mining application)

Responsibility

- MBMU consulted in decision making process - to ensure avoid and minimise steps are fully addressed.
- Accredited consultants to undertake assessments and write EMP.
- WfW manages the credit ledger for the catchment – the MBMT all sign off on the debit with RoD attached as a reference.

10. Monitoring, Auditing and Maintenance of Credits

Description

Monitoring is required to ensure that the projected credits do establish and that they are maintained. As the banker, responsibility for monitoring and maintenance of wetland credits lies with WfW. Monitoring and auditing needs to take place according to the action and schedules set out in the mitigation planning process. Monitoring and auditing will be undertaken by specialist/accredited consultants using available tools as is current practice under the WfW programme. WfW can not be expected to take responsibility for the mitigation site indefinitely or in ‘perpetuity’. As under current practice, responsibility for the mitigation works should be transferred to the landowner after a period considered necessary for the wetland to reach a point where further restoration is a self sustaining process i.e. the wetland has stabilised to a point where it is no longer reliant on the rehabilitation structures.

In the case where a BMA is established between the landowner and the provincial conservation agency, the conservation agency would be responsible for monitoring compliance with the management plan associated with the BMA. In such cases, WfW would still be responsible for monitoring and auditing the wetland rehabilitation during the set period before responsibility is transferred to the landowner.

WfW currently covers the costs of monitoring, auditing and maintenance of rehabilitated sites. As proposed under step 10, the bank client would pay for the full costs of the credit, including monitoring and maintenance costs. Monitoring and auditing reports should be submitted to the MBMU for review and where considered necessary the MBMU would need to approve the proposed remedial measures.

Other key points to note about the model at this stage are that:

- The property and mitigation site remains in the hands of the existing landowner who continues with existing land uses within the conditions as set out in the contract with WfW, or the BMA entered into with the provincial conservation agency.
- Payment by the bank client releases them from the responsibility for establishing or maintaining the bank. The funds provided allow for this to be undertaken by consultants under review by WfW (in terms of wetland mitigation) and the conservation agency (in terms of land-use management plan).

Where projected improvements are not being realised despite remedial efforts the bank balance would need to be adjusted accordingly.

Tools/Data

- Credit ledger
- WET-RehabEvaluate –evaluate success of the rehabilitation effort in achieving goals (and projected credits).
- Legislation to adhered to in the process:
 - NEMA Principles
 - NWA Section 21 applications
 - EIA regulations
 - MPRDA (in case of mining application)

Responsibility

- Consultants - undertake monitoring and audits.
- WfW - manage monitoring and auditing of the
- MBMU – review audit reports.

11. Bank Closure

Description

The bank would be closed once all credits had been sold. The ledger and all documentation related to landowner agreements could be lodged with the DWAF/CMA to inform future decisions regarding development applications on properties with bank sites or on adjacent properties where the activity may impact the bank sites.

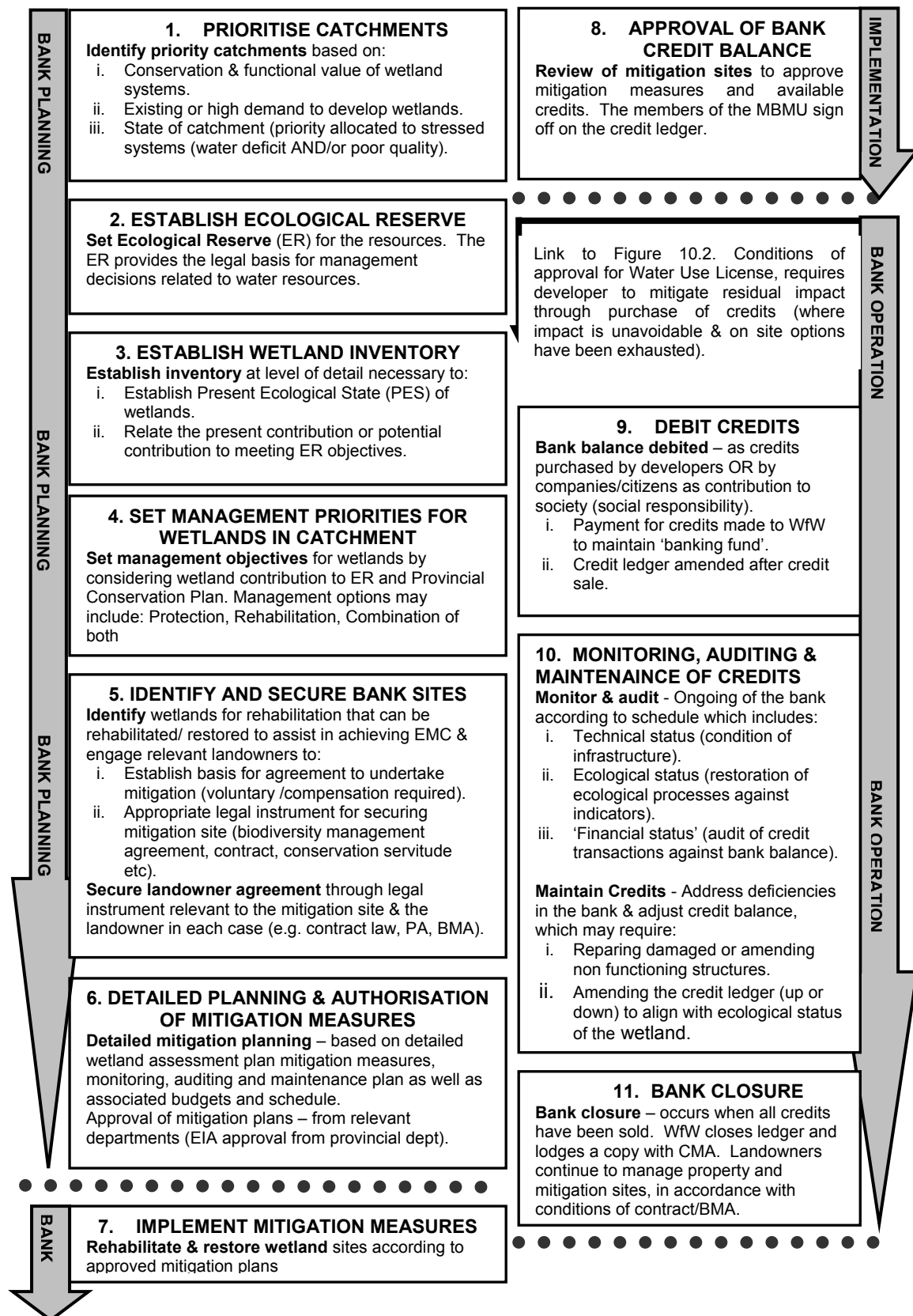
Tools/Data

- Bank ledger

Responsibility

- MBMU -sign off on bank closure
- DWAF/CMA – bank ledger and all documentation lodged with DWAF.

Figure 10.1 Proposed Wetland Mitigation Banking Model for South Africa



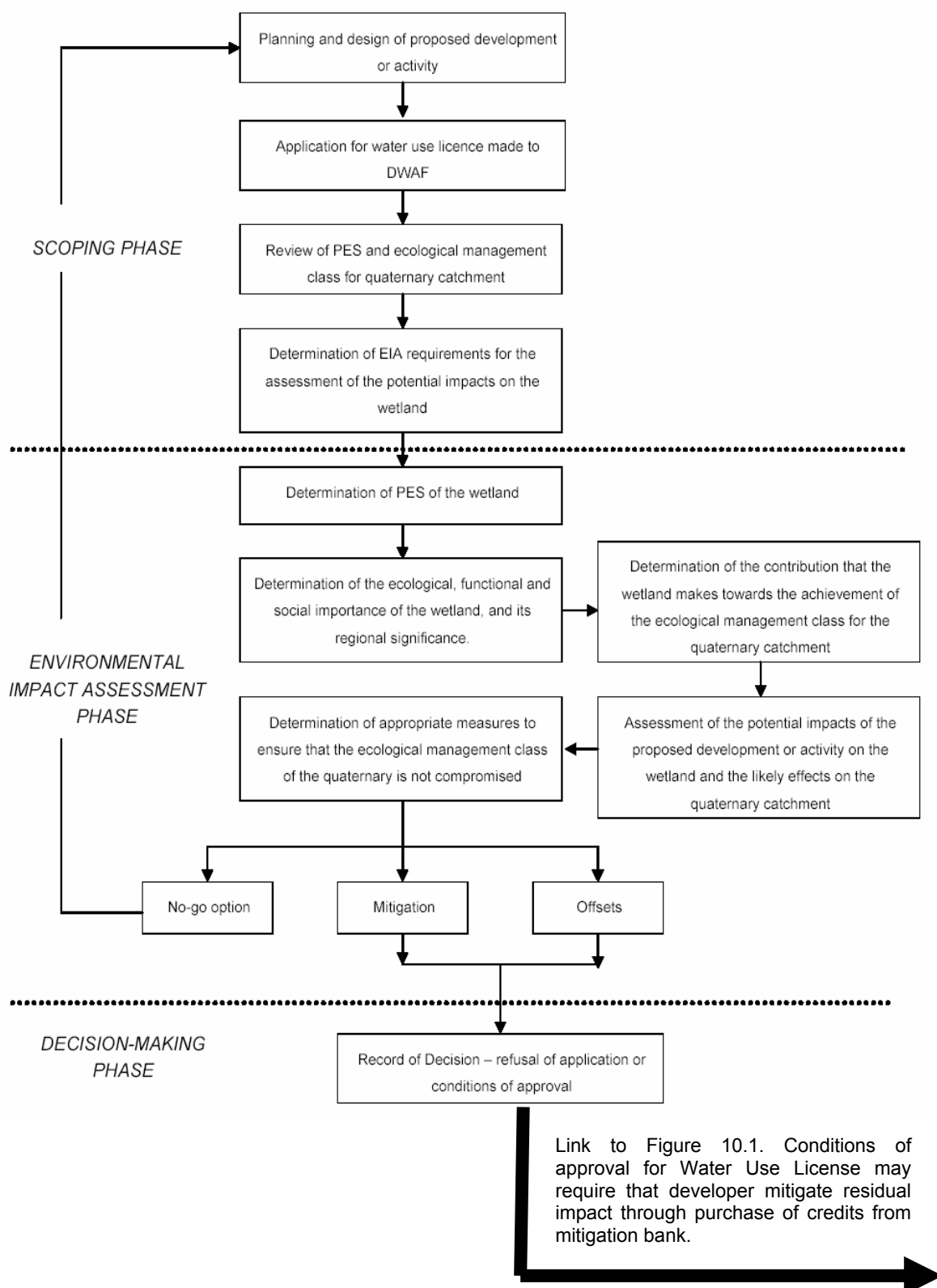


Figure 10.2 Application of the wetland management strategy in the environmental impact assessment decision making process (Oryx Environmental, 2007)

10.5 Motivation for the Structure of the Proposed Model

This section summarises the thinking behind the structure of the proposed model. It lists the main issues and limitations of a banking system as identified in the investigation and

discusses how the model has been designed to overcome or limit these. Mitigation banks developed because of the various benefits the mechanism provides both for wetlands as important ecosystems as well as the banker, bank clients and other role players. An effort has been made to enhance these benefits for different role players and these are also summarised.

10.5.1 Avoiding the Influence of Financial gain on the Effectiveness & Purpose of Mitigation Measures

An advertised benefit of a market mechanism is that it creates an incentive for efficient effort in meeting a demand. Unfortunately, in the case of third party bankers who don't always have conservation as their primary goal, the ability to generate profit also creates incentive to cut corners in setting up and establishing a bank. This is one of the key criticisms of the concept and the primary reason for Canada not adopting it to offset wetland losses in that country. In the proposed model, this issue is avoided by WfW fulfilling the role of the banker.

Furthermore, while there is a general move away from the In-Lieu Fee Mitigation mechanism in the USA, one of the recognised benefits of this model was that setting banks goals and selecting the bank site was undertaken by a multi stakeholder group including government agencies, NGOs and the scientific community. The combination of skills and importantly the drive by such organisations i.e. to achieve their mandate and concern for the environment rather than to make money, invariably leads to effective bank planning. The WfW project prioritisation and planning process is designed to include input from such role-players such as wetland fora and conservation agencies.

10.5.2 Reducing Pressure on the Decision Making Process (Avoid, Minimise, Mitigate process)

In the USA, the majority of the banks are established by national departments or agencies that set up single client banks to mitigate anticipated loss from development projects. It is argued that this inevitably creates an expectation on the part of the applicant that new development will be authorised i.e. it places the department or agency responsible for decision making within the EIA process under pressure to grant a decision in favour of the applicant. There is already significant pressure on the EIA process in this country from the overwhelming development agenda and any mechanisms or concept that adds to this pressure should be avoided. Because it is a non-profit, state funded poverty relief programme. WfW's agenda is therefore one of addressing poverty through sustainable actions focussed on key ecosystems. By WfW acting as the bank, the potential for bankers who are also developers to place pressure on the EIA process is avoided.

10.5.3 Consistency in Planning, Design and Implementation

The level of expertise and skills inevitably differs between the large numbers of bankers that operate in the United States. In addition, the US has in excess of 50 states which implies differing levels of expertise in the regulating organs of state with the combined result that there is inconsistency in the standard of the planning and implementation of mitigation measures used to develop mitigation credits. To a large degree this issue is negated in the model proposed for South Africa by WfW undertaking the planning and implementation of rehabilitation efforts as they rely on a set of contractors in each province to undertake various aspects of the implementation, monitoring and auditing. Many of them have been doing this for several years and are improving with experience.

10.5.4 Reducing Administrative Burden

The review of the United States example revealed that regulating a large number of third part bankers requires considerable resources and that even in a well resourced country like the USA, they have not been able to achieve this. In a country like South Africa where limited capacity is a major issue contributing to widely acknowledged lack of enforcement this issue

would almost constitute a fatal flaw to a banking system involving third parties. By WfW fulfilling the banker role, one organisation is accountable and the need to regulate a wide range of third parties with varying levels of skill and experience is avoided.

In most cases landowners will not want to sell their properties or be bound by stringent conditions that significantly alter their existing land-use practices. Similarly, the state does not want to take on the administrative burden and costs associated with owning property or sections thereof. The model therefore proposes utilising a range of mechanisms which avoid the sale of land, and allow for securing mitigation sites in productive landscapes under existing ownership. The level of control will depend on the circumstances and the mechanism (protected area, BMA or contract) considered appropriate to the specific property or situation.

10.5.5 Improved Decision Making

The model recommends that the establishment of the Ecological Reserve and wetland inventory actions be a pre-requisite to and inform the catchment management priorities, along with the provincial conservation plans. Targets and guidelines set at a strategic (catchment level) will allow for informed decision making at a project specific (EIA) level where it is not possible to address issues such as the cumulative effects of individual developments within a catchment. The cumulative effects are critical in the case of catchments because each component (wetland or stream) form part of a single hydrological system. For example, due to the conservation significance and status of a sub-catchment, the management objective may be to conserve all remaining wetlands and rehabilitate degraded systems. Ideally such a catchment may then effectively be closed to development activities that would compromise this management goal - much like in the case of catchments which are closed to further irrigation and afforestation by DWAF.

Advertising the strategic objectives and targets for a catchment also allows developers to plan in an informed context, by advising them where an application for development is more likely to be accepted than not.

10.5.6 Improved Co-operative Governance

The mitigation banking concept has the potential to assist various government departments in meeting their mandates including DWAF, DEAT, DME, SANBI, NDA and the provincial conservation agencies. The model is designed to assign responsibility to these role players at points in the process where their involvement will assist in them meeting their mandate, thereby acting as an incentive and cementing their commitment to the roles allocated to them. The proposed MOU would need to clearly define these relationships and responsibilities and provide a basis for monitoring participation of the various role-players and 'co-operation' between them.

In acknowledgement of the limited capacity available within certain government departments, a further objective has been to limit the resources required by government departments. In this regard there is recognition that consultants will need to be used at several points in the model to undertake much of the technical work. The financial model is designed so that the cost for employing consultants is borne by the bank clients, thereby also avoiding unnecessary financial burden being placed on government departments.

A further level of co-ordination is required for WfW to obtain authorisation of rehabilitation projects in terms of the EIA regulations. WfW have developed an agreement with DEAT in order to facilitate this requirement being met. This agreement would need to be incorporated in the mitigation banking MOU. The MOU would also list the type and timing of support required from other members of the MBMU, for example advice from DWAF on the

structural aspects of rehabilitation measures and the conservation agency on design aspects related to achieving biodiversity objectives.

Achieving a 'closed' status (referred to in 10.5.5) for a catchment presents a situation that would require effective level government co-operation. This would be particularly necessary in the case mining. Unlike agriculture where there is limited demand to drain and develop wetlands, there are areas such as the Upper Olifants River Catchment where mining resources underlie wetlands and both individuals and various companies have existing rights to mine these resources.

While the DME is responsible for ensuring that mining is environmentally sustainable, their primary mandate is the development of mineral resources. In the case of the upper Olifants River Catchment the catchment is highly stressed and wetlands are effectively destroyed through mining operations. Development of these resources is likely to preclude the Ecological Management Classes set for the various sub-catchments being met. As it currently stands, meeting the EMC will require conservation and rehabilitation of wetlands rather than development. There is therefore a direct conflict between the need to protect water resources in terms of the NWA and develop mineral resources under MPRDA.

There would therefore need to be agreement by DME to remove certain coal reserves from the DME database and compensate the owners of rights to these minerals in order to close catchments. This represents a complex challenge which will require that 'hard decisions' are made by relevant government agencies, namely DEAT, DWAF and DME. It is however a challenge that must be overcome if the requirements of NEMA in relation to co-operative governance and sustainable development are to be met.

10.5.7 Reducing Risks of Failure

This issue relates to various factors already discussed, but particularly that of 'consistency'. In the USA, the implementation and management of mitigation banks by multiple 'bankers', combined with the limited capacity to monitor and enforce banking instruments and agreements, makes it difficult to achieve consistency in the planning, implementation and operation of mitigation banks. This situation is further complicated at a national level due to the development of state specific guidelines, which introduces further scope for variations in how effectively banks are operated.

In this regard, South Africa is at an advantage in that the country has fewer provinces than the USA. Furthermore, several provinces or regions in South Africa are arid and either has limited wetland resources or systems that are not necessarily under pressure from development. This reduces the areas in which banks would be required.

More importantly, the issue of achieving consistency would be overcome by having one banker WfW, applying set standards and working with tried and tested service providers. As proposed there is still a need to develop capacity across government and consulting practitioners who would be responsible for various activities in the model. Establishment of an accreditation system would assist in ensuring quality and consistency.

Risk of ineffective offsets is also reduced by avoiding high risk compensation methods such as wetland creation and rather applying only those in which we have experience i.e. rehabilitation and restoration. Application of the precautionary principle by setting a conservative minimum mitigation ratio e.g. 1:2 or higher, will also limit the risk of failure and meet the requirements of NEMA in applying the precautionary principle. The key role-players in the MBMU need to establish a minimum that will address this issue.

10.5 8 Summary of Benefits for Role Players

The model has attempted to maximise the potential benefits for the various role-players and thereby establish an incentive for effective participation and involvement by each. The potential benefits for the various role-players are listed below:

- *SANBI/Working for Wetlands*
 - The development of a wetland inventory via set procedures and methods at a standard level of detail will assist in planning and management at a catchment level and support the further development, accuracy and usefulness of the national wetland coverage.
 - Support from other agencies is secured via an MOU to assist in various activities throughout the different phases of the banking process. This will facilitate legal compliance of WfW activities as well as improving the technical and ecological sustainability of rehabilitation measures.
 - Probably the greatest benefit to the programme is that the sale of credits provides the finance necessary to address one of the most significant issues that has plagued the programme in the past i.e. accessing sites where landowners require financial compensation, and paying for the development of the legal mechanisms for securing these sites. Furthermore, this mechanism provides a way to give effect to the 'polluter pays principle'. To date the State (via the WfW programme) has been financing wetland rehabilitation and thereby effectively paying for environmental degradation caused largely by the private sector. The opportunity exists through credit sales for developers to contribute to these costs which have in the past have largely borne by society.
 - The establishment of accredited courses will improve the reliability of and number of service providers on which to draw.
- *DWAF/CMA*
 - Catchment management objectives, based on the requirements of the ecological reserve are met through informed decision making and active management actions i.e. rehabilitation.
 - The department's mandate to protect water resources is fulfilled.
 - The model supports decision making both at a strategic and project specific, EIA level by applying the ER, inventory and C-Plan data to set catchment management priorities, and at a project specific (EIA level) by providing an effective mechanism to offset residual, unavoidable impacts.

- *DEAT (national and provincial offices)*
 - Giving effect to the co-operative governance requirements of NEMA is a DEAT mandate which is met through the establishment of the MOU.
 - The model supports decision making both at a strategic and project specific, EIA level by applying the ER, inventory and C-Plan data to set catchment management priorities, and at a project specific (EIA level) by providing an effective mechanism to offset residual, unavoidable impacts.
 - The banking process and the developer are removed from the decision making process - thereby avoiding expectations of a positive outcome and placing undue pressure on decision makers.
- *DME*
 - The model supports decision making both at a strategic and project specific, EIA level by applying the ER, inventory and C-Plan data to set catchment management priorities, and at a project specific (EIA level) by providing an effective mechanism to offset residual, unavoidable impacts. The entire process will assist DME in meeting their responsibility in terms of adherence to the principles of NEMA and facilitating sustainable mining.
- *Provincial Conservation Agencies*
 - The model provides an opportunity to include conservation planning in the process of setting strategic goals and objectives i.e. catchment management strategy.
 - Conservation agencies represent biodiversity in the EIA process and are therefore key interested and affected parties. Having input to the establishment of the bank provides a mitigation measure informed by strategic planning.
 - The state has set targets for increasing the percentage of the country under formal protected area status. Securing mitigation sites as either protected environments or in terms of a BMA, will aid in meeting this mandate. Importantly it allows habitats with high conservation value or corridors between such areas that are located outside of protected areas to be protected within 'working landscapes'.
 - The development of a wetland inventory into which they would have had input in the standard design will better inform conservation planning efforts.
- *Bank Clients*
 - By the relevant authorities setting catchment management priorities, developers are able to plan in a more strategic manner.
 - Are provided with a mechanism where they can meet conditions of approval related to wetland impacts by paying for credits without the burden of designing, implementing and taking responsibility for mitigation sites in the long term.
- *Bank site landowners*
 - May benefit directly and immediately from compensation for loss of income and forgone development rights, and in the longer term through other benefits such as preferential attention from public working programmes, payment for ecological services (if such a system is established) and exemption from property rates and taxes on sale of properties. These benefits depend on the nature of the mechanism established to secure the area or property on which mitigation is undertaken, and further development of some of these ideas and concepts.
 - They gain recognition for their contribution to society.
 - May continue with productive activities on the majority of their property thereby continuing their contribution to the economy.

10.6 Conclusion

The terms of reference required that the suitability of mitigation banking as a mechanism for conserving wetland resources be investigated. The study has concluded that while mitigation banking has several advantages over other mitigation mechanisms, that the model applied in the USA is not appropriate for the local context. However it was also established that there is a critical and growing demand to establish a formal mechanism to manage the offset of residual impacts to wetlands from development activities in this country. The investigation has therefore gone so far as to propose a possible mitigation banking model considered feasible and appropriate to the local context that seeks to avoid the limitations of the concept while maximising the benefits.

Mitigation banking in the USA has developed through research, investigation and practical application involving significant financial and institutional support from state and federal government over a period of 15 years. Despite this, the mechanism is not perfect and continues to be developed. This should be considered when reviewing the banking model proposed in this document as it is based on an investigation for which the available resources limited the methodology to a review of available literature and consultation, often telephonically and via e-mail, which was undertaken in less than six months. Furthermore, the concept of offsets in general and mitigation banking specifically are new concepts in South Africa and required explanation before being able to fully engage role players. Given the range of role-players involved in the proposed model, the scope of consultation possible during the investigation was an important limitation.

It should also be noted that model is a framework and does not address the specific mechanics or various tools and elements necessary to give effect to the model. While several of these exist they still have to be tested in the context of banking system and others need to be developed. Consequently, while the authors consider the proposed banking model feasible this assessment is made in the context of the limitations discussed above and it is likely that additional investigation may identify potential issues and alternatives to the various steps and structure not possible at this level of investigation. Further development of the model is best achieved via application in a demonstration project as proposed by the NGBP. This will for challenges that only can be identified in practice to be identified and addressed. The following sections are concerned with the identification of a suitable demonstration area, a potential pilot project and broad recommendations for implementing the pilot.

11. SELECTION OF DEMONSTRATION SITES AND PROJECTS TO PILOT MITIGATION A MITIGATION BANK

11.1 Identification of Demonstration Sites

As basic criteria, the NGBP required that the demonstration sites be located within the identified priority areas of the grassland biome and that the pilot projects be associated with the mining and/or agricultural sectors. The occurrence of high value wetlands and opportunity to engage in existing projects were also considered important criteria. Various additional criteria were added to meet the requirements of the model proposed in the preceding section to arrive at the following list:

- a. Location within priority conservation areas in the Grasslands biome.
- b. Agricultural and/or mining sector involvement in the area.
- c. High cumulative loss of wetlands.
- d. High demand for/pressure on remaining wetlands from the sector/s.
- e. An express interest/commitment from the sector to the concept of compensatory mitigation of wetland loss.
- f. Ecological Reserve established (according to NWA)
- g. Biodiversity Conservation plan in place (ideally including aquatic component)

- h. Wetland inventory in place (ideally at a level of detail necessary to identify the PES of wetlands)
- i. Identification of priorities for wetlands at a quaternary catchment and individual wetland level.

The following demonstration sites were identified through consultation with various stakeholders and where several of these criteria were known to be met.

11.2 Candidate Demonstration Sites

11.2.1 Upper Olifants River Catchment

• *Overview of the Catchment*

The location of the Upper Olifants River Catchment (UORC) and distribution of wetlands in the catchment are illustrated in Figure 11.1. The Upper Olifants River Catchment (Figure 11.1) is delineated as the area upstream of the Loskop Dam. The section of the Olifants River in this part of its catchment is approximately 200 kilometres long and it has two main tributaries – the Wilge and the Klein Olifants Rivers. The catchment is approximately 15,000 km² and falls within the Mpumalanga and Gauteng Provinces with the majority falling within Mpumalanga (Oryx Environmental, 2007)¹⁴.

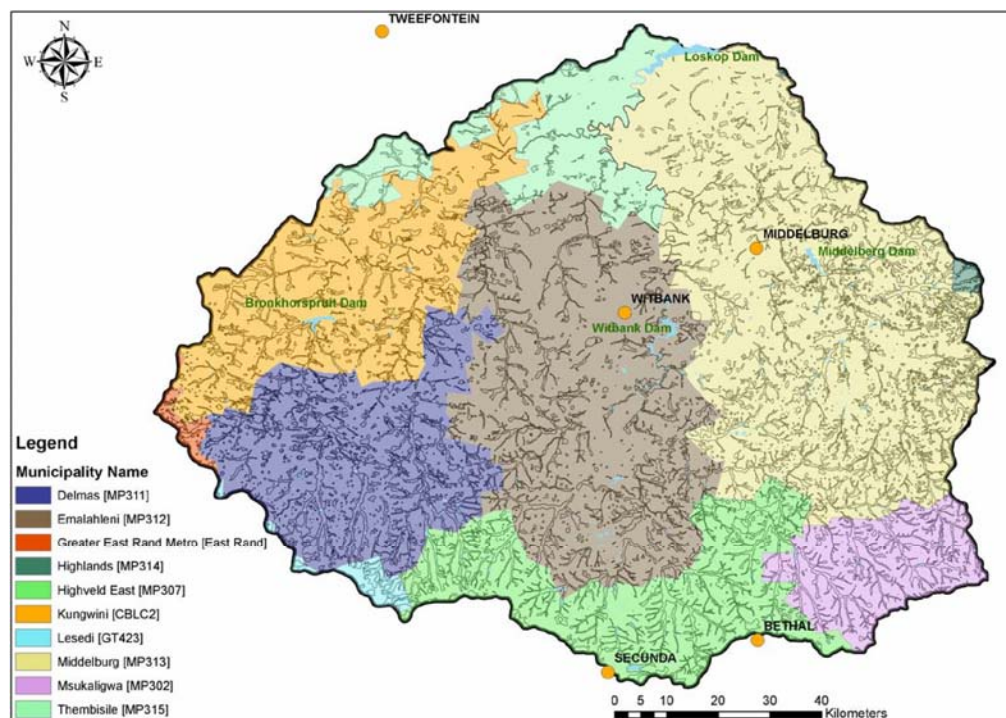


Figure 11.1 Location of wetlands in the UORC (Oryx Environmental 2007)

The catchment falls within two Ecoregions but predominantly within the Highveld Ecoregion which is characterised by gently undulating grasslands with numerous wetlands, underlain by the Vryheid formation Karoo sediments.

• *Water Demand*

The Olifants River Catchment faces a number of challenges and stresses. The entire catchment has a population of nearly 2.8 million people, 723,000 of which live in the upper catchment. Over 80 percent of the population in the upper catchment resides in the urban

¹⁴ Unless otherwise indicated, the majority of the information provided in the section describing the UORC has been drawn from the catchment management strategy developed by Oryx Environmental (2007 – version 2).

environments of Witbank and Middelburg. The main economic activities of the upper catchment occur in the mining and industrial centres around Witbank, which also includes some of the largest thermal power stations in the world. These power stations are the largest water users in the upper catchment (181 million m³/a of 410 million m³/a) and they require water of a relatively high quality. There is currently an overall water deficit in the entire Olifants River Catchment (based on 2000 data) of 191 million m³/a. DWAF have undertaken projections for future water supply and demand in the catchment. Based on these, the deficit is expected to increase to 241 million m³/a for the base scenario and 279 million m³/a for the high scenario. This highlights the existing and growing shortage of water in the catchment.

- *Water Quality*

Water quality in the upper catchment is impacted upon primarily by the intensive coal mining activities that occur within it. Mining activities are predominantly located in the Witbank and Middelburg Dam sub-catchments, which has led to the deterioration of water quality in terms of acidity and increased salinity in the dams over time. In contrast, coal mining activities in the Wilge sub-catchment are low and its water quality is considered to be better than the other subcatchments. This has contributed towards a satisfactory water quality in the Loskop Dam, as a result of a dilution factor. Water quality in the Witbank and Middelburg Dams is managed through controlled release schemes, which make releases of mine water during periods of high flow when assimilative capacity is available in the river system and the downstream dams. This approach is successful in handling excess water during medium to high rainfall periods but there is insufficient assimilative capacity to deal with the poor quality of the excess water during dry periods.

- *Wetland Resources*

Wetlands cover a significant proportion (approximately 20.5%) of the entire catchment area (Xigent, 2006). The wetlands within the catchment are considered important due to the significant extent within the catchment and the key functions they perform. However Palmer *et al.* (2003) note that most of the wetlands in the catchment are already degraded. Of the various land-uses, Palmer *et al.* (2002) identifies mining as providing the most significant direct threat to wetlands in the UORC. According to Palmer *et al.* (2002) all wetland types, including artificial wetlands and wet grasslands, are threatened by mining and quarrying in the UORC. As summarised by Kirkman (2006) large sections of the upper catchment are underlain by coal reserves which represent a high and direct threat to wetlands in the UORC. An overview of coal reserves underlying the UORC and their priority is provided in Figure 11.2.

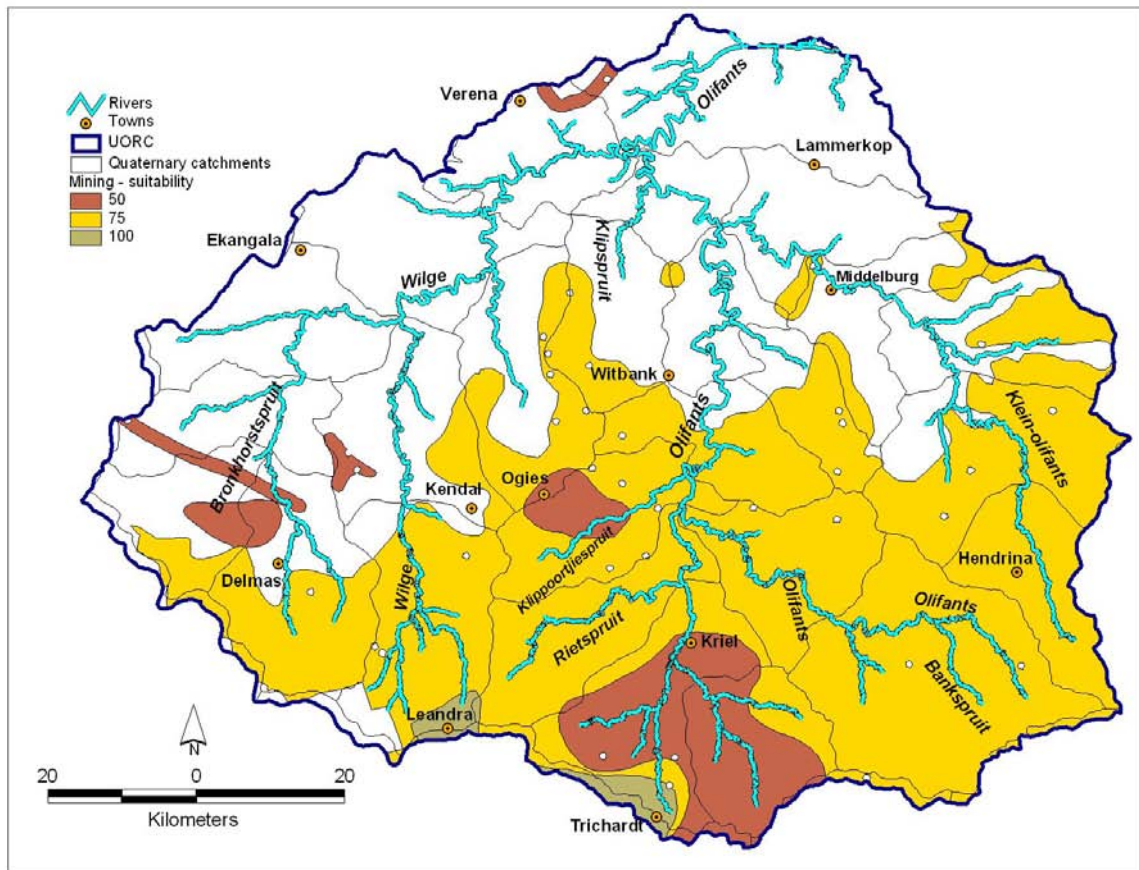


Figure 11.2 Location and importance of coal resources in the UORC.

Surface mining leads to the destruction of wetlands, while underground mining can have significant impacts on water quality and quantity, with certain wetlands types being more threatened than others. While the overview provided in Figure 11.2 is acknowledged to be a rough depiction of the available resources, it illustrates the extent of the available resources and the challenges of conserving wetlands in an area where demand for coal and the available resources are high.

• *Existing and Planned Management Actions*

The degraded and stressed state of the water resources in the UORC has prompted the following responses from the relevant authorities

i) *Ecological reserve determination*

The outcomes of the comprehensive river reserve determination for the UORC are based on four sites selected in the upper catchment upstream of the Loskop Dam and the two major tributaries in the upper catchment – the Wilge and Klein Olifants Rivers. The present ecological state, ecological importance and sensitivity, and the ecological management category for the resources in the UORC are summarised in Table 11.1.

Table 11.1 Ecological status and management classes for Rivers in the Upper Olifants River Catchment.

CATCHMENT AREA	LOCATION	PRESENT ECOLOGICAL STATE	ECOLOGICAL IMPORTANCE & SENSITIVITY	ECOLOGICAL MANAGEMENT CATEGORY
Wilge River	Bronkhorstspuit River upstream of the Bronkhorstspuit Dam.	C	Moderate	C
	Wilge River downstream of Bronkhorstspuit Dam.	B	High	B
Klein Olifants River	Upstream of Middelburg Dam.	D	Moderate	C
	Downstream of Middelburg Dam.	D	Moderate	C
Upper Olifants River	Upstream of Witbank Dam.	D/E	Moderate	D
	Witbank Dam to Loskop Dam.	C/D	Moderate	B/C

In addition to the comprehensive reserve, recommended Ecological Management Categories have been determined for its quaternary catchments as depicted in Figure 11.2. The present ecological state (PES), ecological importance and sensitivity (EIS) and Recommended Ecological Category (REC) scores for each of the quaternary catchments in the UORC are presented in Table 11.2.

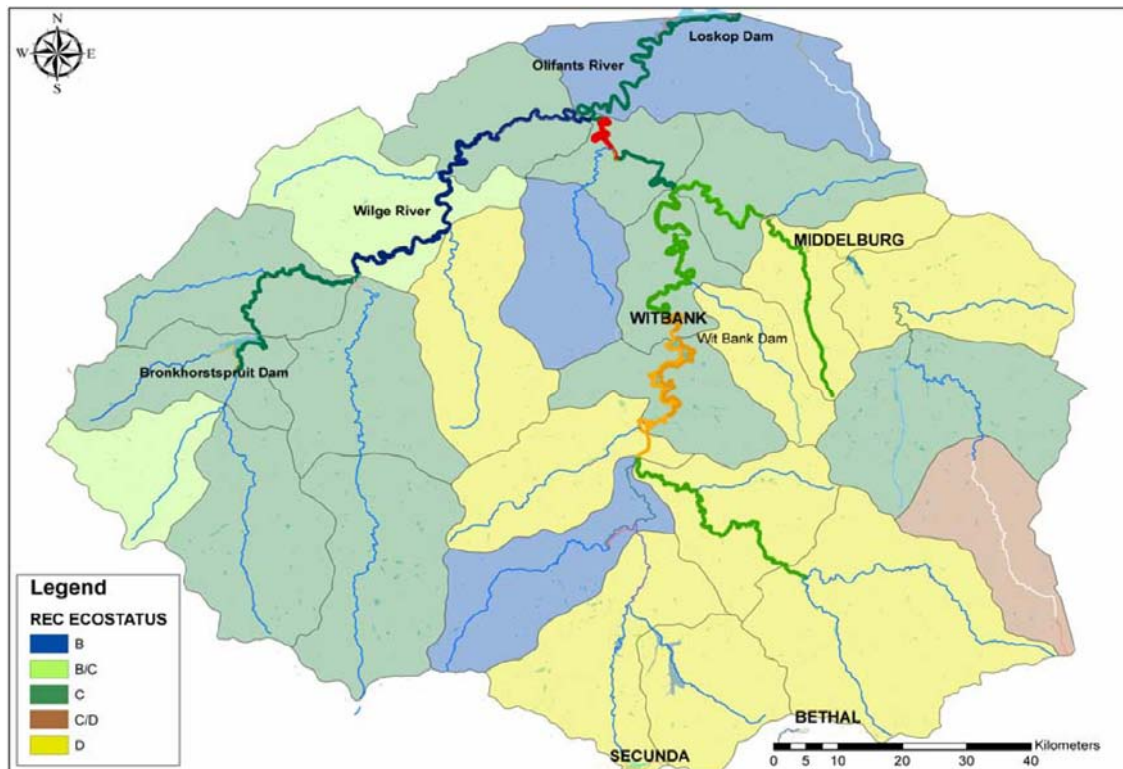


Figure 11.3 Recommended Ecological Categories for rivers in the quaternary catchments in the Upper Olifants River Catchment (Oryx Environmental, 2007)

Table 11.2 PES, EIS and EMC scores for Rivers in the Quaternary Catchments in the Upper Olifants River Catchment (Source: Oryx Environmental, 2007)

Quaternary	PES	EIS	REC	Level of Reserve/ Ecostatusdetermination	Confidence
B11A	E	Low	D	1	Low
B11B*	C	High	C	1	low - v. low
B11C	C	Low/marginal	C	1	Low
B11D	D	Low/marginal	D	1	Low
B11E*	B	Low	B	1	Low
B11F	E	Low	D	1	Low
B11G	E	Low	D	1	Low
B11H	D	Low	D	1	Low
B11J*	E	Moderate	C	Comprehensive	High
B11K*	E	Low	D	1	low - v. low
B11L	C	High	C	1	Low
B12A	C/D	Low	C/D	1	Low
B12B	D	Low	C	1	Low
B12C	D	Low	D	1	Low
B12D	D	Moderate	D	1	Low
B12E*	D	Moderate	C	Comprehensive	High
B20A	C	Moderate	C	1	Low
B20B	B/C	Moderate	B/C	1	Low
B20C	C	Low	C	1	Low
B20D	C	Moderate	C	1	Low
B20E	C	Moderate	C	1	Low
B20F	C	Moderate	C	1	Low
B20G	D	Moderate	D	1	Low
B20H	B	Moderate	B/C	1	Low
B20J*	B	High	B	Comprehensive	High
B32A*	C	High	B	Comprehensive	High

ii) Wetland inventory

Coaltech 2020 commissioned Xigent Engineering to establish a wetland inventory for the UORC that provided baseline data for wetlands mapped. It was required that the data allowed for an assessment to be made of the PES of wetlands at a preliminary level. Figure 11.4 provides a graphic overview of the outcomes of the inventory for the western section of the UORC. The wetlands were mapped using aerial photography with limited ground truthing. According to both various sources including DWAF, the level of confidence in the PES established for the wetlands is therefore low. Furthermore the level of detail does not allow an assessment to be made of the current contribution that each wetland makes to meeting the Ecological Reserve of the Rivers, or in the case of degraded wetlands, their potential to contribute to the ER at a quaternary level. According to Muir (*pers comm.*) a further level of assessment is required to establish this. The assessment would need to be made by applying accepted methods, in this case WET-Health and WET- Ecoservices.

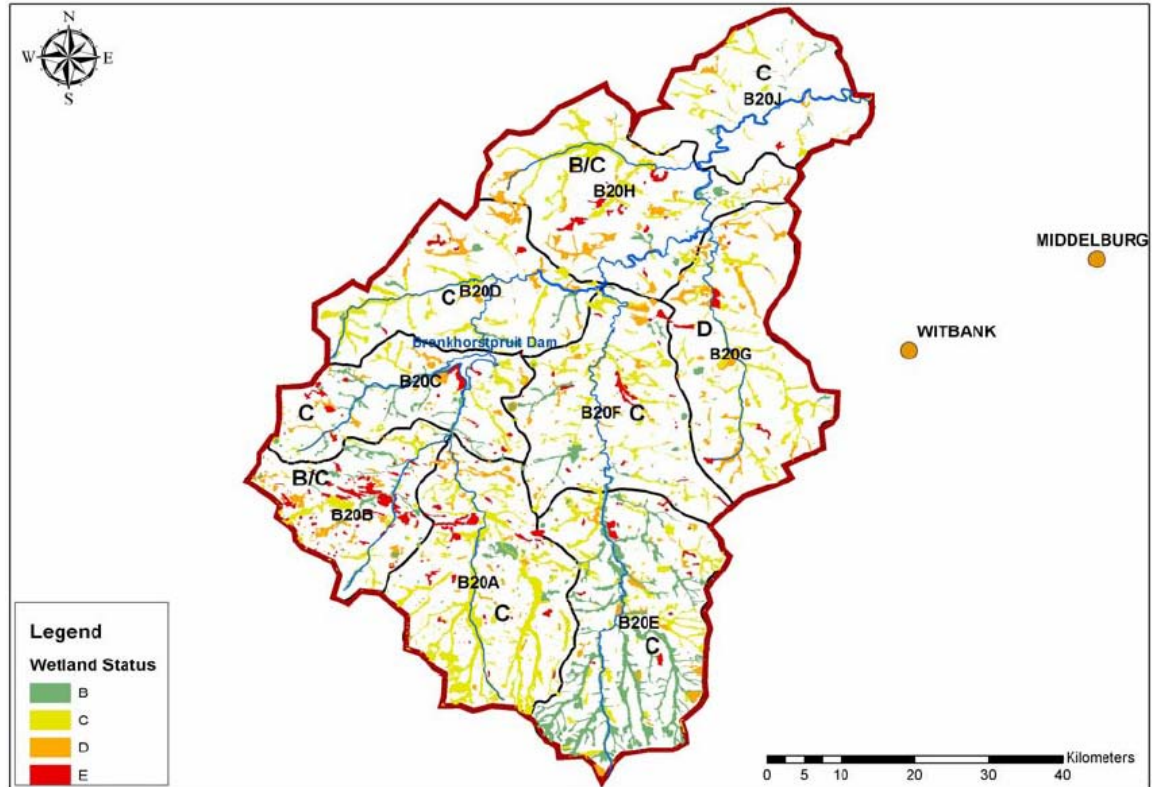


Figure 11.4 PES for wetlands in the western section of the Upper Olifants River Catchment (Oryx Environmental, 2007)

iii) Catchment Management Strategy for Wetlands in the UORC

DWAF commissioned Oryx Environmental to develop a catchment management strategy for wetlands in the UORC. The purpose of the Upper Olifants River Catchment Wetland Management Strategy is to establish a strategic management framework aimed at ensuring adequate biodiversity protection of the wetlands and reinstating an acceptable level of hydrological and ecological functioning in the catchment (Oryx Environmental, 2007).

The strategy proposes setting management objectives for wetlands by considering the state of wetlands in a quaternary catchment (PES identified in the wetland inventory) and what management actions (protection and/or rehabilitation) for the wetlands will contribute to meeting the EMC for the sub-catchment as set by the ER determination. An example of the summary for quaternary B11A is provided in Table 11.3.

Table 11.3 Wetland Status in quaternary B11A (Oryx Environmental, 2007)

	Wetland Area (ha)	A	B	C	D	E
Artificial		0%	0%	0%	0%	0%
Floodplain riparian	11815.39	0%	27.32%	72.68%	0%	0%
Non-floodplain riparian	7971.3	0%	87.46%	9.69%	0.24%	3%
Non-perennial pan	160.25	0%	14.15%	82.04%	3%	1%
Perennial pan	290.25	0%	15%	82%	2%	1%
Seepage	5286.23	0%	7.37%	57.40%	23.69%	11.55%

Based on the PES for the quaternary and the status of the wetlands, the following broad management objectives are proposed. For example, for quaternary B11A, the following is proposed:

The PES score for quaternary B11A is an E, a low EIS and the EMC for the B11A is a D (table B1). The majority of the wetlands are in a B or a C class, apart from the seepage wetlands which have 11.6% in the E class and 23.7% in the D class (Table B2). The emphasis in this quaternary should therefore be preserving the wetlands with the possibility of rehabilitation of seepage wetlands.

Given the preliminary nature of the process applied in establishing the PES for wetlands, specific investigation during the EIA process would be required to assess more accurately the importance of wetlands under threat from development and specific management measures. The strategy proposes a process for facilitating the link between the broad management objectives and the EIA process (see Figure 10.3).

iv) Mpumalanga Biodiversity Conservation Plan

The Mpumalanga biodiversity conservation plan (MBCP) is one of the few in the country that includes an aquatic component. As illustrated in Figure 11.5 sub-catchments have been identified and prioritised according to their conservation significance. The Mpumalanga Tourism and Parks Agency (MTPA) explained that the prioritisation was undertaken at a provincial scale and detailed assessment of the habitat and species present in specific wetlands is required before decisions are made regarding development applications that may impact wetlands directly or indirectly through changes in land-use within the catchment (Linstrom, *pers comm.*). Apart from biodiversity *pers se* (faunal and floral species), the MTPA is also concerned about the functional role of wetlands in maintaining the ecological integrity of water resources in the catchment which according to Linstrom (*pers comm*) this not adequately reflected in the outputs of the outputs of the Conservation Plan which were generated without the wetland inventory data.

v) Planned Off-site Mitigation

AngloCoal have planned and implemented a portion of an off-site mitigation project that was required as a condition of their water use license for the Isibonelo project. They are currently involved in assessing the extent of the phase one work as a basis for establishing how much additional work is required to meet the requirements of the license conditions. Other mining companies are in the process of planning off-site mitigation measures to address impacts established during the EIA for their proposed mining operations. For various reasons, the development of these mitigation plans remains sensitive and can not be reported on.

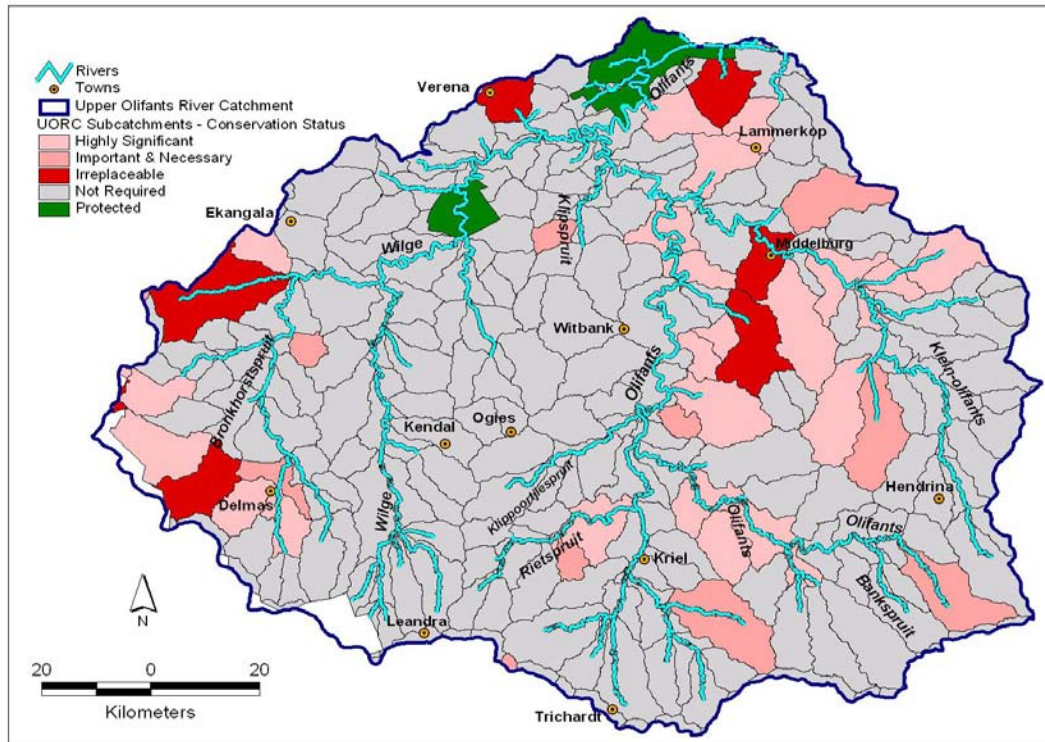


Figure 11.5 Prioritisation of catchments according to Mpumalanga Conservation Plan.

11.2.2 Upper Mooi River Catchment

• *Overview of the Catchment*

The Upper Mooi River Catchment (UMRC) presents a further option for implementing a pilot mitigation bank. The UMRC is located within the midlands region of KwaZulu-Natal (Figure 11.6). The catchment extends from the town of Mooi River and upstream into the Giants Castle region of the Ukhuhamba Drakensberg National Park. The main tributaries to the Mooi River are the Little Mooi and the Hlatikulu Rivers. Apart from Mooi River, the catchment includes the small settlements of Nottingham Road and Rosetta. The predominant land-use in the catchment is commercial agriculture (dairy, beef and crop farming).

• *Water Demand*

Water from the catchment is being transferred to the Mgeni catchment via the various phases and infrastructure that comprise the Mooi-Mgeni Transfer Scheme (MMTS) to meet the growing demand of the greater Pietermaritzburg and Durban urban areas. The scheme involves transfer via a pipeline from Mearns Dam (located just above Mooi River town, to Nottingham Road where it flows via gravity to Midmar Dam, which has been raised in recent years to accommodate the increased supply. Apart from the inter-basin transfer, the most significant direct demand on the resource is for irrigation by commercial agriculture which occurs throughout the length of the catchment, particularly in the Little Mooi River Catchment where there is still significant demand for additional irrigation.

• *Wetland Resources*

As in the case of the UORC, wetlands cover a considerable proportion of the total catchment UMRC. In excess of 9 000 ha occur in the catchment (excluding protected areas where wetlands are not under threat and have therefore not been mapped). Cox (1998), estimated that approximately 45% of the wetlands in the catchment were at varying levels of degradation. The primary cause of the wetland loss being agricultural activities that directly (draining, damming, grazing, farm roads and fences, water abstraction and cropping within wetlands) and indirectly (point sources of pollution such as piggeries and dairies, non-point sources of pollutants such as run-off and water use by timber plantations) impact wetlands.

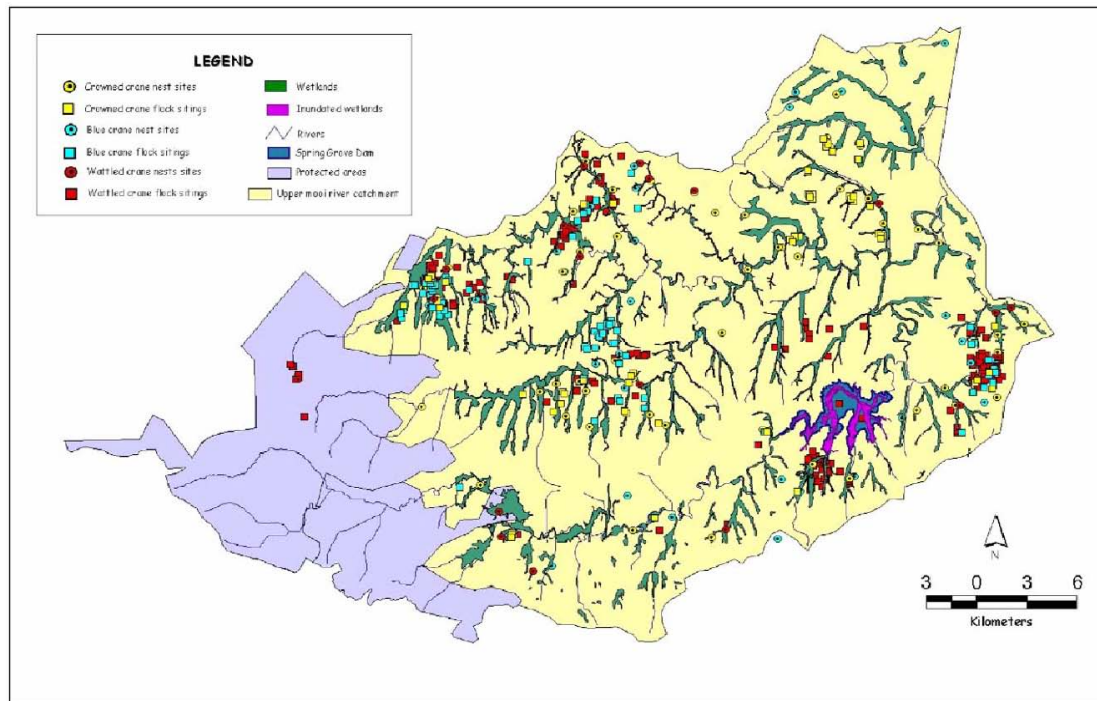


Figure 11.6 Extent and distribution of wetlands and sites utilised by the three crane species occurring in the Upper Mooi-River catchment (Cox, 1998)

• *Existing and Planned Management Actions*

i) *Ecological Reserve*

The Mooi River falls within the Thukela Water Management Area for which a comprehensive reserve determination was undertaken. The reserve set for the Mooi River Catchment has however not been authorised by DWAF and is not being implemented. This is due primarily to current use and demand exceeding projected or estimated demand which prevents the reserve being implemented without further negotiation and development of Spring Grove Dam (a proposed storage facility located on the Mooi River - see Figure 11.6)

ii) *Wetland Inventory*

A wetland inventory was established by Cox (1998) to inform the environmental impact assessment component of the feasibility study for the MMTS. The spatial coverage is considered accurate and involved significant ground truthing. The attribute data however is considered outdated and needs to be linked to the GIS. Furthermore, while much information was collected it is not available in a format that could be utilised to establish the PES according to recently developed methods.

iii) *Planned Off-site Mitigation*

The impact on wetlands (deepwater inundation) by the proposed Spring Grove dam during the feasibility assessment prompted the proponent, DWAF, to investigate opportunities for off-site mitigation. Cox, Kotze & Russell (2003) undertook an investigation that identified candidate rehabilitation (1091 hectares). Landowners were consulted and agreement obtained to rehabilitate 338 ha on 14 wetlands located on eight properties in the UMRC and adjoining Upper Mgeni River Catchment (UMRC) (Figure 11.7). Site assessments were conducted and rehabilitation planning, including a monitoring and maintenance programme with associated costing was developed. Due to uncertainty of the timing and lack of an appropriate legal instrument, landowner agreement was only obtained 'in principle' upon which basis rehabilitation planning took place. Ownership of several of these properties has subsequently changed hands and DWAF will need to renegotiate with the new owners. The EIA for Spring Grove Dam is currently underway. DWAF, who are the proponent, are committed to the offset and have written the offsite mitigation into the draft Environmental Management Plan. Furthermore, the project manager has expressed his interest in the banking concept, and wishes to be kept informed of developments and possible involvement.

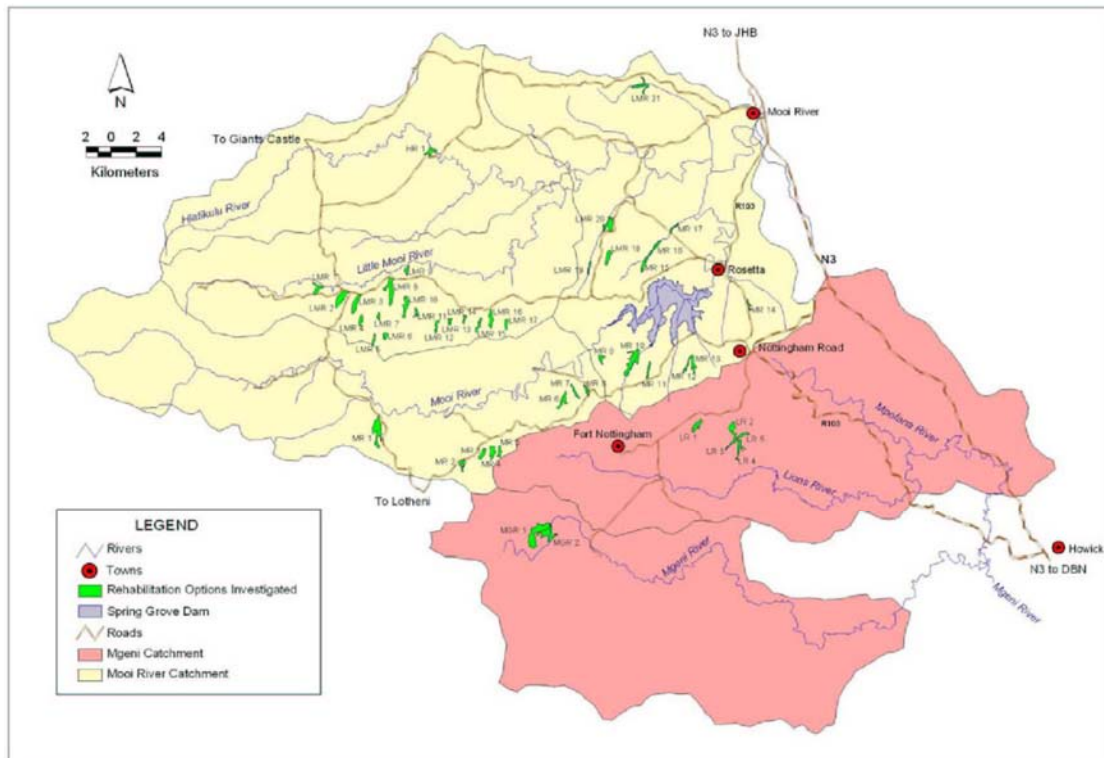


Figure 11.7 Location of mitigation sites identified in the Upper Mooi and Upper Mgeni River catchments to offset the impact to wetlands from the proposed Spring Grove Dam (Cox, Kotze & Russell, 2003).

11.2.3 Prioritisation of Demonstration Sites

11.2.3.1 Suitability of Different Sectors to a Banking System

The NGBP has selected to work with the agricultural and mining sectors due to their influence on resources in the grassland biome. The suitability of different sectors with regard to piloting a wetland mitigation banking system depends on the likely demand from a sector for mitigation credits. This section discusses the current and likely future demand from the mining, agricultural and other sectors for a mitigation bank which has bearing on the specific criteria used to prioritise between the candidate demonstration sites.

- *Agriculture*

In South Africa, considerable wetland area has been developed into commercial cropland, most of this taking place from the 1950s through to the 1970s with the support of government. During the 1980's, with increased awareness of environmental issues, government support for wetland development declined and legislation for wetland protection was developed. The Conservation of Agricultural Resources Act 43 of 1983 makes provision for wetland protection by requiring a permit for cultivating or draining a wetland. More recently the EIA regulations (promulgated in 1997 under Section 21 the Environment Conservation Act, No 73 of 1989), listed the “infilling and draining of wetlands” as an activity which required authorisation based on consideration of an environmental impact assessment. The combined effect of these legal provisions has resulted in a substantial reduction in the transformation of wetland area for new commercial cropland, and applications to do so.

The agricultural sector is under pressure to maximise use of limited arable areas, which in many cases demands irrigation to improve yields. Furthermore, cultivation of ‘virgin land’ is capital intensive. There is therefore still a demand to build storage dams to facilitate the irrigation of commercial cropland. By submerging wetlands, farm dams have a direct impact on these systems and hereby generate a demand for credits.

- *Mining*

Mining has traditionally, and continues to play a significant role in the country’s economy. Furthermore, there is currently significant demand to upgrade the country’s electricity supply capacity which relies on coal as a major source of energy. Consequently there is extensive mining planned within catchments such as the Upper Olifants River Catchment which includes vast coal reserves that in many cases underlies extensive and important wetland systems. This represents a direct and significant threat to wetlands that is likely to continue into the medium to long term. Given the economic and strategic importance of coal mining, the pressure on the government departments responsible for considering the authorisation of applications to mine wetlands is significant and the strategic planning process involved in the proposed model along with the availability of a systems for addressing residual impacts would significantly assist in the decision making process.

- *Conclusion*

A pre-requisite for operating a mitigation bank is that there is a demand for credits. In terms of other land-uses, the loss of wetlands through deep flooding by farm and large storage dams (such the Spring Grove), infrastructural developments (e.g. roads), and general urban expansion continue to occur widely across South Africa, and are unlikely to diminish in the future. These sectors or land-uses therefore represent likely clients for a banking system.

Given the decline in demand to cultivate wetlands agriculture is not an ideal land-use type to choose for piloting a banking system, unless the specific focus is on farm dams.

The demand from the mining sector to develop wetlands within stressed catchments such as the UORC, in addition to the economic importance of the sector, makes it the more appropriate of the two sectors. The demand for the development of an offset mechanism is highlighted by the recent investigation and application of off-site mitigation by various coal mining companies in the UORC. The will expressed by these companies and the relevant authorities to entertain these offsets is a further and important factor in highlighting the mining sector as the more appropriate of the two with which to collaborate in piloting the proposed banking model.

11.2.3.2 *Prioritisation of Demonstration Sites*

A comparison of the candidate demonstration sites against the selection criteria is presented in Table 11.4.

Table 11.4 Assessment of situation in the UORC against criteria for selecting test catchments to pilot a mitigation bank

.CRITERIA		Upper Olifants River Catchment	Upper Mooi River Catchment
a	Location within priority conservation areas in the Grasslands biome	The UORC is located within the grassland biome.	The UORC includes threatened grasslands types.
b	Agricultural and/or mining sector involvement in the area.	Agriculture is the largest land user (over 35%) followed by mining and quarrying Palmer <i>et al.</i> (2003)	Agriculture is the largest land user. There are no significant mining (and no coal) present in the UMRC.
c	High cumulative loss of wetlands.	High existing level of degradation reported by Palmer <i>et al.</i> (2003).	Degradation estimated to be approximately 45% (Cox, 1998).
d	High demand for/pressure on remaining wetlands from the sector/s.	There is significant pressure on wetlands from proposed open cast coal mining.	Major single impact from Spring Grove Dam but not from agricultural sector - no demand to drain/cultivate wetlands and the catchment is closed to further irrigation dams.
e	An express interest/commitment from the sector to the concept of compensatory mitigation of wetland loss	There are several wetland mitigation initiatives in various stages of development and implementation.	While DWAF have committed to off-site mitigation to offset impacts from the proposed Spring Grove Dam, they do not represent the agricultural sector.
f	Ecological Reserve (according to NWA)	Comprehensive reserve established as well as EMC for quaternary catchments.	Reserve determination undertaken but not authorised or implemented.
g	Conservation plan (ideally including aquatic component)	The Mpumalanga Biodiversity Conservation-Plan completed. It includes an aquatic component at a sub-catchment level and integrates these with the terrestrial components.	Ezemvelo KZN Wildlife has developed a comprehensive C-Plan. It does not include an aquatic component.
h	Wetland inventory (ideally at a level of detail necessary to identify the PES of wetlands)	Inventory in place and PES established for individual wetlands - PES needs to be established at better resolution. - Need to establish contribution of wetlands to EC	Spatial coverage developed but spatial data outdated and not adequate to assess PES without further work.

i	Identification of catchment priorities (management priorities for wetlands in sub-catchments set against EMC)	Broad management objectives set for wetlands at a quaternary scale – need to be updated based on improved inventory.	Management priorities not set.
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Of the two candidates considered, the Upper Olifants River Catchment is considered the most suitable demonstration site for the following reasons:

- There is a significant future demand in the catchment to mine coal reserves underlying wetlands occurring in the catchment. The limited demand (apart from dams) from the agricultural sector to ‘develop’ wetlands in the UMRC represents a major limitation given that this is one of the two key criteria set by the NGBP in identifying a demonstration site.
- There is express commitment from both the coal mining sector and authorities in the UORC and existing examples of collaboration in implementing off-site mitigation (AngloCoal, Isibonelo Project). While there is express commitment from DWAF in the UMRC, they do not represent the mining or agricultural sectors.
- The strategic tools and information considered important for implementing the proposed model are in a more advanced state of development in the UORC than in the UMRC. The ER has been set for the UORC, it has been authorised and is effective. Furthermore, the attribute data in the wetland inventory developed for the UORC is far more comprehensive, and notwithstanding its limitations has allowed for an initial assessment of the present ecological state (PES) of wetlands, and has informed broad management priorities set against catchment objectives identified in the ER. While a reserve and wetland are in place in the UMRC, additional work needs not be undertaken with both to reach a stage where management priorities can be set for wetlands in the catchment. A further advantage of the UORC is that the Mpumalanga biodiversity conservation plan includes an aquatic component that prioritises catchments. The aquatic component of the KwaZulu-Natal C-Plan is still under development.

The planned off-site mitigation project in the UMRC should not be ignored as it provides a further example of compensatory mitigation of wetlands in South Africa from which valuable lessons can be learned.

11.3 Identification of Pilot Projects

Several mining companies attended the mitigation banking forum at the grasslands partner’s symposium hosted by the NGBP in November 2006 where they were introduced to the concept of mitigation banking. One of the agreed outcomes of the participants was agreement by attendees to pilot the concept with one of the mining companies operating in the UORC. Through consultation with WfW, the NGBP and interaction with the consultancy firms contracted by mining companies, three potential projects were identified.

AngloCoal have already implemented a proportion of the required off-site mitigation for the Isibonelo Project and are planning phase two of the project to meet the outstanding offset requirements. The other two companies are working closely with WfW and the relevant authorities in the province in planning offsite mitigation measures to meet conditions of approval for their water use license. While these companies have expressed interest in the banking concept due to the timing of their initiatives and other factors, they have requested that their projects not be considered as options at this stage. According to the companies consulted the main benefit of the banking systems is that it avoids the company having to take

responsibility for planning, establishing and most importantly managing the mitigation effort in the long term. There is a considerable scope for working with these companies and they should be consulted regarding the opportunities and benefits of being included in the pilot.

AngloCoal represent a secure bank client in that they have a legal obligation in terms of their water use license. More importantly they have expressed willingness and commitment both during phase one and in consultation of the opportunities presented in phase two to work with WfW. Further information and discussion regarding the project is provided below.

- **Background**

The EIA established that the Isibonelo project would impact a 96 ha section of a larger wetland system calculated to be approximately 263 ha in extent. The conditions of the water use license for the project required that this impact be mitigated through off-site mitigation. During phase 1, AngloCoal rehabilitated a wetland area of approximately 40 ha.

- **Current Status**

According to Molamu (*pers comm.*) in order to meet their obligations in terms of the offset, AngloCoal first need to identify the size and functional value of the first phase and they are in the process of commissioning consultants to undertake this assessment. The outcomes of the assessment will inform the selection of appropriate mitigation sites, both in terms of size and wetland type.

- **Opportunities**

According to Coombes (*pers comm.*) there are various aspects of the phase 1 work that AngloCoal consider to be limitations and which they wish to address in phase 2. One of these is the need to understand the ecological benefits derived from phase 1. In addition to meeting their legal obligations, AngloCoal wish to ensure that the mitigation is meeting the key principles of an affective offset i.e. that the systems in the mitigation site are the same as those impacted (like for like compensation), and to establish whether the engineering measures area resulting in the projected ecological benefits. The other concern is that the agreement entered into with the landowners on whose property the phase 1 mitigation was implemented, were not binding in the long term. These are some of the key issues identified in this review of the mitigation banking concept and AngloCoal wish to investigate the options discussed in this document for addressing these issues.

Coombes (*pers comm.*) also indicated that involvement in the pilot would link in well with the broader focus of the work AngloCoal is doing with IUCN and the BBOP initiative around developing appropriate offsets mechanisms for adoption by business. This project therefore presents an opportunity to work with a committed company in testing and developing the various technical tools, exploring the different legal instruments for securing mitigation sites and developing the institutional structure for a banking system as proposed in this document.

12. FRAMEWORK FOR PILOTING A MITIGATION BANK IN THE UORC

Ideally a pilot project would involve WfW establishing credits in advance of projected demand for credits. As it stands, WfW has not generated credits in the UORC, AngloCoal have already implemented a portion of their required offset and not all the other elements required in the 'ideal model' are in place.

However, it is unlikely that the ideal situation for a pilot would ever exist and much has been done in the UORC to make it a more than suitable demonstration site. Furthermore, there is a five year period available for implementing a pilot which demands that it commence as soon as possible. Various government agencies and departments are already committed to the

existing and planned initiatives through the EIA and other licensing processes. This support needs to be entrenched in a pilot that seeks to add another level of benefit to the OSM work that is already underway and maintain the momentum generated by these initiatives. In view of the current situation, it is suggested that the following approach and structure be taken in piloting the proposed model. The proposed framework is presented in the following way:

- An overview of the approach to achieving the overall objectives of the pilot.
- A summary of the specific steps in the banking model according the three phases (planning, implementation and operation). Actions, roles and responsibilities are indicated for each step.
- A summary of how the banking process is located within the broader framework for the pilot project is provided along with a proposed schedule.
- A summary of the members of the Mitigation Bank Management Unit (MBMU) relevant to the UORC and the Mpumalanga province are listed.
- High level resources (personnel and finances) considered necessary to implement the pilot are provided.
- Broad indicators for monitoring the success of the pilot are proposed that relate to the objectives included in the NGBP's log frame for its work with the coal mining sector.

12.1 Proposed Approach to the Pilot Project

While recognising the need to adapt the model to the circumstances in the UORC, the suggested approach is to align the pilot as closely to the suggested model as possible. This will allow an assessment to be made of whether the proposed model is in fact the most appropriate. Furthermore, because the model is a framework, it is preferable to develop the specific tools, processes and arrangements that give effect to the various steps in the framework within a situation that is as close to the ideal situation as possible, rather than one that is substantially different.

It is suggested that the NGBP consider implementing the pilot at two levels:

- The sub-catchment (quaternary) level by working with AngloCoal on phase 2 of the Isibonelo project.
- The catchment level (UORC).

Quaternary Scale

It is projected that AngloCoal will at most need to rehabilitate approximately 200 ha of wetland to fulfil their outstanding commitments (Molamu, *pers comm*). Phase two of the Isibonelo project is in effect project specific off-site mitigation and not a bank per se. In addition, working with a single company who plays a role in financing certain aspects of the offsets and benefits makes the situation closer to a single client bank which is common in the USA but which the investigation identified as a structure to be avoided. The other potential limitation is that, working at a smaller scale may not allow for certain aspects of the model to be tested. For example it may not be possible to test the full range of instruments available for securing mitigation sites.

Despite the recognised limitations, there are various benefits of working at this scale. It will allow for many of the tools, processes and mechanisms necessary for a pilot bank to be established at a smaller scale that is more easily managed than at the catchment scale. It will take time and considerable co-ordination to address outstanding elements at the catchment scale such as the added level of detail required for the wetland inventory. Working at a smaller scale with a committed company who may fund certain activities reduces risks of not achieving any level of success within the available timeframe. Furthermore, the outcomes of the process at the quaternary level will inform the process at the catchment scale.

Catchment Scale

While it is recommended that the pilot be focussed on working with AngloCoal at the quaternary catchment level, it would be beneficial if the project could be extended to development credits in the UORC as a whole, or at least in those sections where the demand is highest and the catchment is under the most threat (Figure 11.2).

There is a critical need for a banking system in the UORC and several of the elements required in the planning phase of the bank have been established. The pilot banking project provides an opportunity to consolidate the outcomes achieved so far. It also provides a motivation for sourcing the funding required to finance outstanding elements required to take the process forward. Furthermore, the sub/catchment level approach will allow the model to be tested in its proposed form and the scale proposed for implementation if the concept is applied in other catchments across the country.

Getting the finance and mechanisms in place to set up the catchment scale bank will take some time. The catchment process would therefore run behind the quaternary level project but will be informed by and use the structures, processes and tools established through the quaternary level initiative.

Whether NGBP decide to extend the pilot outside of the quaternary catchment identified will depend largely on the resources available to the programme, what is achievable over a five year period based on progress in the pilot quaternary, and the progress of other initiatives in the catchment.

The activities required at each step in the model are discussed for the quaternary and sub/catchment scales (referred to as the catchment scale). The discussion is structured around a situation where the pilot is undertaken at both levels (the ideal situation). Costs are later provided that make a distinction between the two options and upon which a decision may be based.

12.2 Implementing the Banking Model

Rather than repeat the model as presented in section 10, this section discusses what needs to take place to implement the model in the UORC. It discusses actions, roles and responsibilities at the UORC and quaternary levels.

12.2.1 Bank Planning

1. Prioritise Catchments

• Catchment scale

As discussed in section 11.2.1 the UORC meets the criteria of a priority catchment - it is a stressed catchment with extensive wetlands systems of high value that are in many cases degraded and which face significant future threat from various activities, particularly coal mining.

• Quaternary scale

To meet a basic principle of off-site mitigation, the outstanding offset for the Isibonelo project should be undertaken in the same quaternary catchment as the impact, which is B11C. The location of this quaternary catchment is illustrated in Figure 12.1 between Bethal and Secunda.

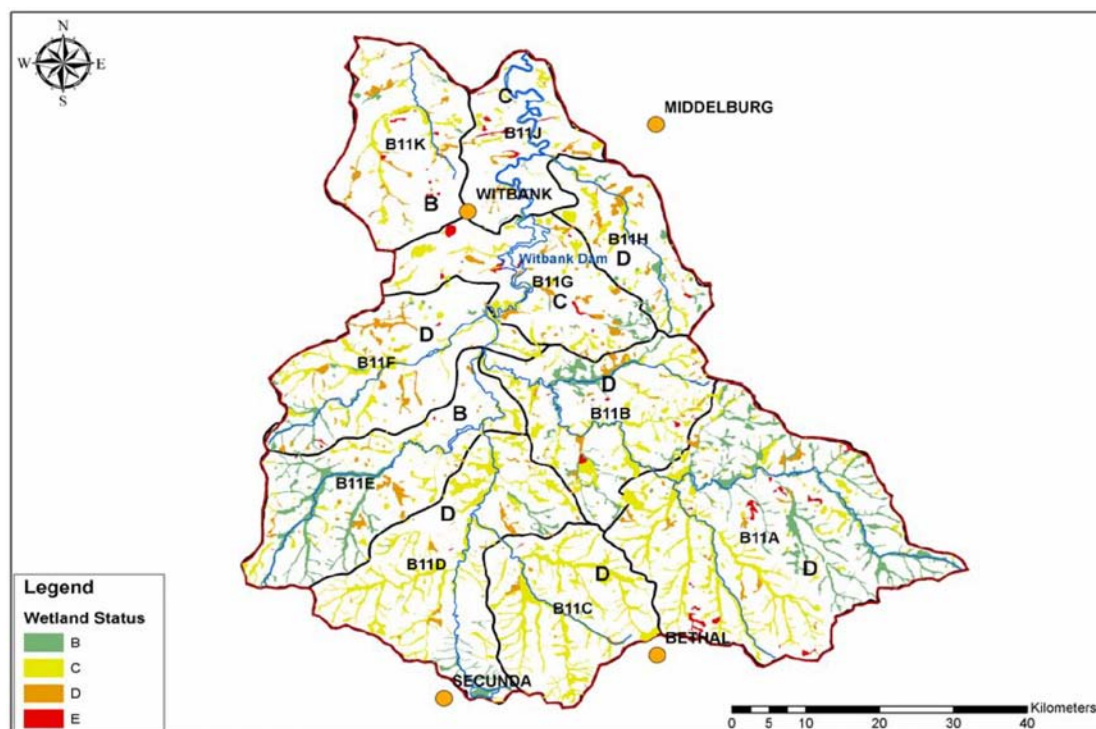


Figure 12.1 Location of quaternary catchment B11C within which the Isibonelo Project is located showing PES of individual wetlands and the EMC for the quaternary catchment

2. Establish Ecological Reserve

• Catchment scale

The Ecological Reserve for Rivers has been set for the UORC, the results of which are summarised in 11.2.1¹⁵.

¹⁵ It must however be pointed out that the ER has only been set for river systems. This is because the protocols and methods for determining the ecological reserve for wetlands are still in the process of being finalised.

• **Quaternary scale**

Ecological management categories have been set at the quaternary scale. The B11C quaternary has a PES score of D/E, a low EIS and an EMC of D.

3. Establish Wetland Inventory

• **Catchment scale**

A wetland inventory has been compiled for the UORC. Unfortunately it has not been undertaken at a level of detail necessary to:

- Establish the PES of the wetlands at an appropriate level of confidence, or
- Identify the contribution of wetlands to meeting the ER a quaternary catchment scale.

This limits the value of the inventory in setting management priorities for wetlands in the catchment (discussed in more detail under step 4). The situation highlights the need to develop guidelines and standards for undertaking a wetland inventory at this scale if the output is to serve the purposes of establishing a mitigation bank.

To address this outstanding element and enable the establishment of a bank at the catchment scale, consultants need to be appointed to undertake this assessment according to agreed methods and funding is required to finance the study. To date, the development of the inventory has been driven by DWAF with support from Coaltech 2020. This is the first point in the process for the pilot where the MBMU have a role to play as a co-ordinated unit by agreeing on a method to address the limitations of the inventory and to source funding necessary to finance the necessary work. The funding could either be sourced from within the MBMU or from external sources.

• **Quaternary Scale**

The locations of wetlands occurring in BC11 are indicated in Figure 12.1. The extent and status of different wetland types are summarised in Table 12.1 (abstracted from the wetland inventory prepared by Xigent). It provides a preliminary indication of the type and state of wetlands in the quaternary catchment.

Table 12.1 Wetland status in quaternary B11C

	Wetland Area (ha)	A	B	C	D	E
Artificial	105.19	0%	0%	94.89%	5%	0%
Floodplain riparian	6627.99	0%	0.00%	100.00%	0%	0%
Non-floodplain riparian	18.77	0%	0.00%	0.00%	44.11%	56%
Non-perennial pan	40.77	0%	1.99%	68.48%	25%	4%
Perennial pan	19.02	0%	14%	86%	0%	0%
Seepage	1356.75	0%	1.67%	62.75%	35.57%	0.00%

If funding is secured for the necessary work at the catchment level, then the process of updating the inventory should start in the B11C quaternary catchment. If there is a delay in sourcing finance for the catchment scale process or NGBP decide to focus only at the quaternary level then it is suggested that AngloCoal finance this study.

While the inventory is being updated, AngloCoal can continue with the process of assessing the phase one rehabilitation and calculating the extent of the rehabilitation required in phase two, as well as the type of wetland that would ensure 'like for like' compensation and meeting other principles discussed in this document required to achieve best practice for the offset.

4. Set Management Priorities for Wetlands in the Catchment

• Catchment Scale

The catchment management strategy produced by Oryx Environmental for the UORC proposes that the following sets of information be considered in developing management objectives for specific wetlands in the catchment:

- Wetland inventory
- Ecological reserve, and
- Mpumalanga conservation plan.

The aim of this process is to arrive at of the inventory that includes management objectives for each wetland. According to Muir (*pers comm.*), there are currently two factors affecting the ability to develop this coverage:

- The limitations of the inventory discussed under the previous step, and
- An established mechanism (process, criteria, responsibility) for integrating this information, particularly the Mpumalanga conservation plan (MCP). The MCP was established at a provincial level and does not include biodiversity information at the scale of individual wetland systems i.e. the resolution is therefore not currently appropriate.

Addressing this situation requires that:

- The MBMU develop a system for integrating the various inputs in arriving at the management priorities for individual wetlands.
- Before the integration of this information and data can take place, the additional work on the inventory, as discussed in step 4 must be undertaken. Given the incompatibility of the scale at which the MBCP was compiled in relation to the inventory and the ER, additional assessment of the conservation value of the wetlands would assist in incorporating the inventory into the integrated analysis of the proposed data sets.

• Quaternary Scale

Based on the current inventory and ER requirements, the status and management objectives for the Quaternary B11C are summarised as follows (Oryx Environmental, 2007): *The quaternary has a PES score of D/E, a low EIS and an EMC of D. A high proportion of the non-floodplain riparian wetlands are in the D (44.11%) and E (56%) classes. 25% of the non-perennial pans and 35.57% of the seepage wetlands are in the D class. According the preliminary prioritisation process, "the emphasis in this quaternary should be on the rehabilitation of the wetlands in the D and E classes"*.

The mechanism for integrating the various data sets can be developed at quaternary level first, because the updated inventory can be established far quicker than for the catchment as a whole.

5. Identify and Secure Bank Sites

• Catchment Scale

The outcomes of the prioritisation process (step 4) would identify those wetlands requiring rehabilitation and restoration to meet catchment objectives. The relevant landowners would need to be identified and consulted to establish:

- The basis for agreeing to mitigate wetlands on their property (voluntary or financial compensation).
- What legal mechanisms would be appropriate for securing the site, and
- Obtaining principle agreement to proceed with this process.

Responsibility for identifying and engaging landowners would lie with WfW as per their current *modus operandi*.

Accessing Priority Mitigation Wetlands

The model proposes that WfW meet the costs where the basis of agreement is conditional on landowners receiving financial compensation. WfW will need to establish:

- How this fund would be set up and operated, and
- Criteria and guidelines for setting compensation values (compensation may be set according to market values with assistance of professional valuers, and guided by the Expropriation Act 63 of 1975).

The criteria and basis for negotiation would need to be established before engaging identified landowners. Once the cost of compensation was established, the source of the finance would need to be made available. This would require that WfW start investigating the source of the funding at the outset of the pilot.

Securing Mitigation Wetlands

As suggested the nature of the instrument used to secure the mitigation effort will depend on various factors. Of the legal instruments currently available for securing wetlands it was suggested that the following may be applicable

- Contract between WfW and the landowner. These contracts are being developed by WfW and their establishment with the landowner would be managed by WfW.
- The other instrument suggested was the development of Biodiversity Management Agreements between the landowner and relevant Conservation Agency, in this case, the Mpumalanga Tourism and Parks Agency (MTPA).

According to Linstrom (*pers comm*) the MTPA are currently in discussion with certain mining companies around the application of the Protected Areas Act (PAA) to conserve mitigation sites. This mechanism is preferred because of the security it provides to mitigated sites from future mining. In cases where the appropriate legal instrument is a biodiversity management agreement (BMA) or a protected area, the process needs to be managed by the MTPA as the responsible government agency for administering the Protected Areas Act Linstrom (*pers comm*.) and others engaged during the project have confirmed that the MTPA currently lacks the necessary capacity to administer these processes. The NGBP are funding a single person to work with landowners on such agreements in the project they have in the Wakkerstroom area, but they are dedicated to this project. The Botanical Society has also recently appointed a staff member to work on development of a stewardship programme in Mpumalanga. According to McCann, experiences from the KwaZulu-Natal stewardship unit indicate that at least two staff members are required to get stewardship established and operational. In KZN there are three staff members in the stewardship unit who between them handle approximately 18 sites which vary in extent and in the number of properties involved. If the pilot is undertaken at the catchment scale, then funding will be required to finance additional capacity within the MTPA to manage this aspect of a model.

- **Quaternary Scale**

Given the limited demand (approximately 200 ha) for the quaternary scale component of the pilot, it is possible that priority sites do not include landowners who demand financial compensation. For the purposes of testing the model rehabilitation should take place on a site where the landowner demands compensation because it will be important to develop and test criteria and guidelines for setting compensation values, even if this means adopting a site that is not as high on the priority list as others.

Ideally WfW should finance the compensation and AngloCoal pay them for the credit so as to test the transaction process. This will provide an opportunity to set up and test the processes and systems for effecting such a transaction. If WfW has been unable to secure the funds required to compensate landowners by the time it is required, then AngloCoal should pay for this component of the credit in advance.

6. Detailed Planning and Authorisation of Mitigation Measures

- **Catchment Scale**

Having secured agreement from landowners, WfW would proceed with detailed assessment of mitigation sites, development of rehabilitation measures and approval thereof as proposed in the model.

- **Quaternary Scale**

The process would proceed as described at the catchment scale.

12.2.2 Bank Implementation

7. Detailed Planning and Authorisation of Mitigation Measures

Detailed planning of mitigation measures would be undertaken by WfW as described in bank model at both the catchment and quaternary scale.

8. Approval of Bank Credit Balance

Approval of bank credits to be undertaken as described in bank model at both the catchment and quaternary scale.

12.2.3 Bank Operation

9. Debit Credits

- **Catchment Scale**

Credits would be debited as described in the proposed model.

- **Quaternary Scale**

According to AngloCoal (Aken, *pers comm*), none of the companies planned developments are likely to impact wetlands (generate a demand for credits). It is however still possible to test the transaction process by AngloCoal paying WfW for the credit. This requires that WfW pay for the development, implementation and preferably also, any compensation required by the landowner i.e. as proposed in the model, the bank client should have as little to do with the establishment of the credit as possible.

10. Monitoring, Auditing and Maintenance of Credits

Credits would be monitored and maintained at both the catchment and quaternary levels.

11. Bank Closure

The mitigation undertaken at the quaternary level will in effect not involve bank closure because the credits will be developed post impact, rather than in advance of the anticipated impact. The process of signing off on the closed ledger following payment for the credit can however still take place.

12.3 Institutional Arrangements and Resources

12.3.1 Role players and Responsibilities

The Mitigation Bank Management Unit (MBMU) will comprise the government departments and agencies listed in table 12.1. In addition to the primary responsibilities listed in the table, these role-players will be required to have input into the development of various tools, mechanism and processes that are required to establish and operate the bank. These include among others:

- Memorandum of Understanding between MBMU members.
- Guidelines and a process for integrating the ER, biodiversity conservation plan and wetland inventory in setting management objectives for wetlands.
- Guidelines and standards for developing a wetland inventory.
- Tool for setting mitigation ratios.

For the development of certain elements such as the MOU, all members of the MBMU will need to be involved. For other elements MBMU members will only be involved where they have expertise to contribute and/or where the development of the element or tool falls within their mandate.

Table 12.2 Summary of institutions, their roles and responsibility

INSTITUTION	ROLES & RESPONSIBILITY
Working for Wetlands (WfW)	• Co-ordinate the pilot and chair the MBMU. • House the project management unit (PMU). • Provide technical advice on all matters. • Administer the banking process e.g. house and manage the bank ledger. • Plan, implement and monitor rehabilitation measures. • Manage landowner consultation process (in collaboration with MTPA depending on relevant mechanism).
Mpumalanga Tourism and Parks Agency (MTPA)	• Manage the establishment, operation and enforcement of landowner agreements and associated land-use management plans set up in terms of the PAA and the NEMBA.
Department of Water Affairs and Forestry (DWAF)	• Give legal effect to the management priorities set for wetlands by incorporating them in the catchment management strategy. • Ensure that impacts are unavoidable through EIA & processes & that mitigation measures are entrenched in water use licenses. • Enforce conditions (mitigation) of license.

Department of Minerals and Energy (DME)	• Give effect to the management objectives set for wetlands in the catchment by excluding them from the database of resources available for development. • Ensure that impacts are unavoidable through EIA & processes & that mitigation measures are entrenched in conditions of mining right. • Enforce conditions (mitigation) of approval.
Mpumalanga Department of Agriculture and Land Affairs (DALA) – environmental management section.	• As the provincial representative of DEAT, and responsible for NEMA, take responsibility for co-facilitating operative by managing the development of the MOU. • Provide input into the EIA process (and manage it should the proposed structure of the EIA regulations come into effect).

Other role players who should be involved in the pilot project are:

- AngloCoal – will play a major role in the pilot and will work closely with the MBMU.
- Other coal mining companies – expressed their wish to be involved and should be consulted and kept informed during the project.
- Chamber of mines and Coaltech 2020 – as representatives of the coal mining sector at large.
- Wetland forums – the Gauteng and Mpumalanga wetlands forum should be involved.
- Civil society - any NGOs or civic organisations who have a real interest and would like to contribute to the project.

12.3.2 Willingness of Role players to Participate

The terms of reference required that the willingness of various role players and stakeholders to be involved in a pilot banking project be reflected.

During this interaction, most notably the Grassland Partner's forum, various coal mining companies expressed their interest in and support for the mitigation banking concept. As discussed by Kirkman (2005), the major mining companies are positively disposed to the concept of biodiversity offsets but are at the same time cautious due to risks associated with an offset area not being managed after the particular mining company has moved on. The potential exists for the companies name and reputation to be compromised.

Existing offset initiatives in the UORC involve the mining company taking responsibility for development and management of offsets. While these companies acknowledge the need and responsibility to offset environmental damage from their activities, biodiversity planning and management is not their core business, nor do they have the necessary skills and expertise. The proposed banking model appeals to the mining companies because it allocates this responsibility to WfW and the landowner, and includes mechanisms for addressing this risk associated with long term management of the credits.

Importantly, AngloCoal as the preferred partner company have expressed their willingness to be involved and thereby both address their outstanding commitments, but in so doing also address some of the limitations of the phase one rehabilitation and link the pilot to other strategic initiatives concerned with biodiversity offsets.

In the case of the relevant government departments they have expressed the need to deal with offsets at a strategic level and pro-actively which overcomes many of the problems associated with the current situation. Presently decision making regarding project specific offsets are made under pressure and in a vacuum of strategic information that fails to indicates

irreplaceability and thresholds for wetlands in the UORC and which prevents the relevant authorities from making informed decisions.

Most importantly the key departments have been involved in the various initiatives already undertaken or planned and are therefore already committed to further development of offsets within the context of the legal framework. These role-players also recognise the potential of the banking system to assist in meeting their mandates. Their questions, concerns and views have been discussed and considered in the development of the proposed model

The one exception to the generally positive response to the concept was the department of minerals and energy. Despite numerous efforts including written and verbal communication, their response was limited and did not allow a point to be reached where they provided effective comment on the concept. For the catchment management strategies set for wetlands in the catchment to be effective, the DME has to accept these and give effect to them. For example, by removing coal reserves which underlie wetlands identified as critical for meeting the requirements of the ER from those available for development.

DWAF also recognise the importance of the role of DME and have invited them to participate in the development of the catchment management strategy for wetlands in the UORC. Muir, (*pers comm*) confirmed that DWAF had received limited support from and participation by DME in the process. They are similarly concerned that they had not yet been able to discuss DME's views on potential catchment management decisions and their implications for mining in the catchment. This is a potentially significant issue and without effective collaboration, may only be addressed through confrontation between the requirements of the MPRDA and the NWA.

12.3.3 Institutional Structure

Suggested institutional arrangements for the pilot project are illustrated in Figure 12.2. The NGBP have planned that WfW will manage the implementation of the pilot project. The project management unit (PMU) would likely be housed within WfW and include WfW management. It is also suggested that at least two additional staff, a project manager and an administrator, be required and appointed for the duration of the pilot.

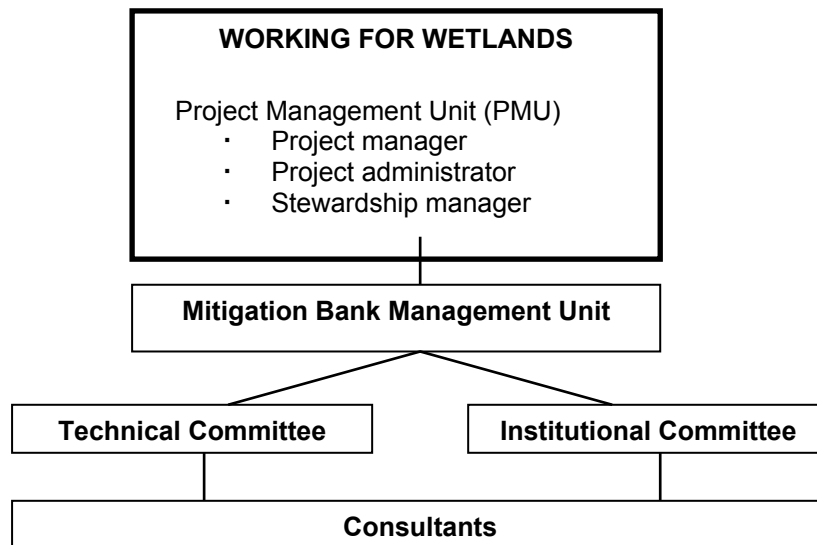


Figure 12.2 Possible institutional set up for implementing the pilot project.

The PMU would be responsible for directing and co-ordinating the pilot. The mitigation bank management unit (MBMU) would include representatives from each of the various member organisations and AngloCoal as the partner company. There are various elements (tools, processes, methodologies etc) that need to be developed in order to implement the banking model, some of which are technical in nature and others which are related to institutional and financial arrangements and processes. It is therefore suggested that two committees be established to oversee the development of the various elements relevant to each. It is proposed that the committees include representatives from the members of the MBMU with the relevant expertise to have input to the development of a particular tool or process. In the case of both institutional and technical aspects, consultants will be required to provide the necessary specialist capacity. The two committees would manage the consultants input in meeting the various tasks and responsibilities assigned to each committee.

The PMU would be responsible for all administrative arrangements and reporting so as to limit the time and resources allocated by the various government officials involved in the pilot. For example, the project manager would draw up terms of reference for consultants with input from the committee members.

The project manager will co-ordinate the various activities and sub tasks necessary to implement the pilot. In order to inform policy, it will be important to report not only on the outcomes of different aspects of the pilot, but also on the issues and challenges faced in the process of undertaking each phase and sub-task i.e. the process itself will be as important as the outcome for informing policy. It is suggested that reporting be bi-annual and at the end of specific outputs, e.g. development of a tool such as the guidelines and criteria for setting mitigation ratios. Annual programming should be directed by the progress achieved each year. This will also inform the targets and actions for the next year. Other responsibilities of the project manager would include:

- Financial management
- Reporting to MBMT
- Liaising with other components of the NGBP.
- Liaising with and drawing on experiences from international initiatives such as BBOP.

The WfW programme employs service providers to undertake its rehabilitation planning, implementation, as well as the monitoring and auditing of rehabilitation projects. Additional

services will be required for the purposes of the pilot project. The following is a preliminary list of tasks for which specialist services may need to be procured depending on the skills and capacity available within the members of the MBMU and the level to which they are able to contribute these resources to the pilot project:

- Development of an MOU to manage interactions and operation of the MBMU.
- Updated wetland inventory that establishes PES for wetlands and their potential/existing contribution to achieving the EC for the catchment.
- Development of guidelines and criteria for integrating and analysing strategic information necessary to set management priorities for wetlands – and applying these tools.
- Development of guidelines and criteria for setting mitigation ratios.
- Design of financial processes and tools for operating the bank e.g. a banking ledger.
- The following services may be required to assist in setting up contracts and agreements with landowners:
 - Land surveyors (to survey mitigation sites)
 - Property valuers (to set appropriate market value of compensation, where required).
 - Legal clerk (draft contracts).
 - Environmental practitioner (develop land-use management plans should MTPA not have adequate capacity).

For certain of these tasks, the outcomes will be the same if one undertakes the pilot at the quaternary of the catchment level e.g. developing an MOU to manage operation of the MBMU. For other tasks, the costs will be directly proportional to the increased size of undertaking the pilot the larger scale, for example updating the wetland inventory.

12.4 Projected Budgets

Budgets to finance the staff costs for the proposed personnel are summarised in Table 12.3. Indicative costs for each position are based on the likely time they will work per year and the likely salary scale given their position.

Table 12.3 Estimated budget for operation of project management unit (2007 rates)

PROFESSIONAL FEES			
POSITION	NATURE/ Duration	ANNUAL COST	TOTAL COST
Project Manager	Permanent - 5 years	R 300 000	R 1 500 000
Project Assistant	Permanent - 5 years	R 100 000	R 500 000
Stewardship Manager	Permanent - 2 years	R 200 000	R 400 000
Sub-total Professional Fees			R 2 400 000
OPERATING COSTS			
Based on 20% of the total professional fees.	Cover costs of equipment, travel, document production, workshops and meetings etc. (assume office space provided by SANBI)		R 480 000
TOTAL COSTS			R 2 880 000

If the pilot is undertaken at the quaternary level, it is projected that between 5 and 10 properties will be required achieve the 200 ha estimated to be the outstanding requirement for AngloCoal to meet their offset requirements. In terms of the stewardship appointment, it is suggested that a single person contracted with pilot funds, and working with the person recently appointed by the Botanical Society may be sufficient to manage the landowner consultation process and establish necessary agreements within a 2 year period. It is recommended that this person be housed within the MPTA and thereby provide the organisation with an opportunity to establish stewardship capacity.

It is understood that the NGBP has approximately R3.5 million available for the pilot project. This would leave limited budget for contracting consultants required to undertake the variety of tasks listed, and potentially others not yet identified. Additional funding is therefore likely to be required. The level of additional funding will be established more accurately during the detailed planning phase when tasks and necessary technical support is made clearer.

The NGBP target for the coal mining sector of the programme is to get 2000 ha of wetland secured via mitigation banking. Achieving this target would require that the pilot be expanded to the UORC or a number of priority quaternary catchments, which would require a larger degree of co-funding. Based on comment from McCann (*pers comm*) regarding experiences of the KZN Wildlife Stewardship Unit, a further permanent staff member would probably be necessary to handle landowner agreements and contracts. The costs of other elements such as updating the wetland inventory would also increase significantly. The amount would depend on the number of additional properties required to attain the target area of 2000 ha.

12.5 Pilot Project Schedule

A broad schedule for implementing the pilot over a 5 year period is outlined in Table 12.4. The time frames have been broken down into the various aspects related to establishing and operating a mitigation bank, and indicate when it would be necessary to reach key points – move from one phase to the next to the next in order to ensure that the point is reached where the bank is operational - credits have been sold and the bank is being monitored and maintained.

It is likely that certain phases of the pilot can and should overlap to reduce delays and allow for as much implementation time as possible. This schedule will need to be refined following the stakeholder workshop and consultation which forms part of the first task of this phase.

Table 12.4 Guideline schedule for implementing the pilot project

PHASE	Year 1		Year 2		Year 3		Year 4		Year 5	
	1 st	2 nd	1 st	2 nd	1 st	2 nd	1 st	2 nd	1 st	2 nd
1. Pre-implementation phase										
2. Planning phase										
3. Implementation phase										
4. Operational phase										
5. Close out phase										

▪ *Pre-implementation phase*

This phase will involve analysing the outcomes of this investigation as a basis for more detailed planning. This process should commence with a series of workshops and individual meetings with the key role-players (MBMU) and the partner company to present the outcomes of this study. The aim of the workshops will be to:

- Establish a sound understanding of the concept and potential benefits to all.
- Refine the model as well as the roles and responsibilities played by each institution.
- Consider the issues documented in the study and agree on the aim and objectives of the pilot project as well as guiding principles.
- Compile the agreed understanding, commitment and more detailed points such as protocols for communication etc.

The outcomes of the initial phase will inform more detailed planning. During this phase the PMU would need to set up, a manager and administrator appointed and operational set up established.

It would be necessary for AngloCoal to have established the outstanding mitigation requirements to inform the detailed planning process.

▪ *Planning phase*

During this phase the various elements necessary to plan the mitigation need to be developed. This would include updating the inventory and developing criteria for setting management objectives for wetlands in the pilot site, and culminate at a point where mitigation sites have been identified and landowner agreement secured (at least in principle – it may be that finalised agreements may take longer to secure).

▪ *Implementation phase*

Implementing the rehabilitation could overlap with the planning phase as implementation could commence on properties where agreement is secured relatively quickly.

▪ *Operational phase*

It is considered necessary to have at least 2 years in which to operate the bank in order to learn sufficiently from the process or monitoring and auditing.

▪ *Close out phase*

Reporting should be ongoing from the first phase with reporting related to the pilot and against indicators as defined in the MOU. During the final year a process should be put in place to start summarising the lessons learned throughout the pilot process. This will guide policy formulation at the end.

12.6 Indicators for Measuring Pilot Success

For the pilot project to be successful it is essential that the issues identified in this study which have the potential to undermine the effectiveness of a banking system are avoided or limited. These were grouped as either technical or institutional in nature and indicators need to be developed for each to monitor whether or not these are being addressed in the pilot.

For example, the effective participation of the members of the MBMU in the pilot is an essential requirement for the pilot succeeding (addressing the issue of co-operative governance).

Examples of indicators that would illustrate whether this issue is being addressed are:

- Signing of the MOU
- Attendance at all meetings.
- Meeting deadlines for authorisation of mitigation measures (DALA).

Similar indicators would be required for technical issues. For ecological issues certain principles need to be agreed on upfront, such as whether to consider preservation as a mitigation option. Based on this indicators would need to be developed that reflect whether principles are being adhered to.

A third set of indicators considered necessary are those relating to the basic administration of the pilot (budget being met) and broader aims of the project which may be to:

- Provide regular circulation of updates or progress of the pilot on the wetlands list server or in the press.
- Become integrated in larger initiatives such the BBOP programme

These are the three broad sets of indicators considered necessary to monitor the success of the pilot. Specific indicators should be developed within these categories in the pre-planning phase. Reporting against these will assist in documenting the lessons learned.

The types of indicators suggested above relate to the process. The NGBP set aims and indicators of success for the coal mining component of the programme (Table 12.5). The first indicator is concerned with getting the general principle of offsets adopted by the mining sector and government. Mitigation banking is a specific mechanism for achieving effective offsets for impacts to wetlands. Although specific to wetlands, its development and testing will contribute to the more general goal set by the NGBP.

The banking pilot project relates more closely to the second objective 'areas protected through mitigation banking/offsite mitigation' and the proposed targets set by the NGBP are provided. The suggested indicators are provided below the original ones in the table and underlined. It is the author's opinion that given the current situation in South Africa, the development of a mechanism to guide the effective offset of unavoidable impacts to wetlands is of greater importance than the area actually secured. The indicators provided under 1 in the table relate to establishing and testing such a mechanism.

The third set of indicators set by the NGBP relates to the adoption and application of the Mpumalanga Biodiversity Conservation Plan by mining companies in their planning. The mitigation banking project does not have this as a specific goal. However, the banking project does require that the MBCP, be used in setting management priorities for wetlands. This requires the development of guidelines and tools for achieving this. If these are developed, applied and the outcomes accepted by the mining sector then the MBCP will have informed strategic planning for coal mining activities.

Table 12.5 Aims and objectives of the NGBP for the coal mining sector of the programme.

Indicator	Baseline	Mid-term target	End of project target	Sources of verification
1. Principle of off-sets adopted by coal mining industry and government	No off-set policy		Policy supporting offsets adopted by coal mining companies and government	Pilot project documentation Coal mining company and government policy documents
2. Amount of land where wetlands protected through wetland mitigation and/or banking offsets.	0 ha of protected wetlands	800 ha of wetlands protected through offsets	2 000 ha of wetlands protected through offsets	Mining company reports - <u>Mitigation planning, implementation & monitoring reports</u> - <u>Bank ledger</u>
3. Biodiversity planning information used by mining companies and regulatory authorities to plan new coal mines	MBCP not yet adopted by provincial cabinet	MBCP used by Mp DME & 3 companies	MBCP used by Mp DME & all big companies	Maps showing location of coal mines has taken biodiversity priority sites into account

13. CONCLUSIONS AND WAY FORWARD

South African legislation demands that unavoidable impacts are mitigated. The study has discussed the limitations of recent offset activities relating to impacted wetlands and other systems in this country. It is apparent that both business and the regulatory authorities are increasingly considering offsets to address the pressures associated with development activities in a context where strategic information and planning are often not available. Given the lack of effective offset mechanisms and the fact that it is a growing 'science', there is an urgent need to investigate what mechanism are appropriate.

In the case of wetlands, mitigation banking is considered worthy of investigation. It provides a pro-active approach to addressing impacts to wetlands that benefits not only the developer but the regulatory authorities. We have extensive background, experiences from the USA to draw on and experiences from other countries relating to components and tools that are required to implement a banking system.

Furthermore, the country has the benefit of a state-funded programme that essentially generates credits. The timing is therefore right to pilot a mitigation bank.

The study has proposed an ideal model and one that could be piloted in a demonstration site along with broad suggestions as to how the pilot may unfold. The investigation has been undertaken at a very preliminary level. It is therefore recognised that the recommended model and way forward in piloting it requires further refinement and detail.

In taking this process forward, it should be recognised that, while the role players associated with the proposed pilot have a broad understanding of the concept, it is a concept that has not been considered in South Africa in any detail before. Furthermore, there are many

stakeholders in government, industry, academics and consultants who are sceptical of offsets in general.

The way forward, therefore, requires intensive consultation with the key role players to further their understanding of the concept, address uncertainties and indicate how the concept has the potential to benefit them in meeting their mandate and wetland resources. Such consultation should therefore be the first step in taking this process forward.

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A presentation was made to a group of approximately 50 people who attended the coal mining component of the NGB partner's forum in November 2006. The group included several of the people listed above but many other consultants, representatives from mining companies and government departments also attended.