

Wetland Management Series

WET-RoadMap

A Guide to the Wetland Management Series

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Front cover:

Seekoeivlei in the eastern Free State during a sizeable flood (Georg Wandrag)

CONTENTS

The WET-Management Series: WET-Roadmap	
Assessment and implementation methods for wetland management and rehabilitation	4
What does the WET-Management Series offer?	5
Why are wetlands valuable?	6
Why rehabilitate wetlands?	7
What is wetland rehabilitation?	8
Principles that guide successful wetland rehabilitation	9
Wetland hydro-geomorphic (HGM) types used in the WET-Management Series	10
Overview of the WET-Management Series: Background Reading	12
Overview of the WET-Management Series: Tools	13
WET-Tools to use at different stages of planning and implementing rehabilitation work	16
Relevance of the components of the WET-Management Series	17
Index	18

ACRONYMS

CARA	Conservation of Agricultural Resources Act
CMA	Catchment Management Agency
DEAT	Department of Environmental Affairs and Tourism
DoA	Department of Agriculture
DWAF	Department of Water Affairs and Forestry
EIS	Ecological Importance and Sensitivity
EPWP	Expanded Public Works Programme
HGM	Hydro-geomorphic
NEMA	National Environmental Management Act
NRMP	Natural Resource Management Programme
NWA	National Water Act
PES	Present Ecological State
SANBI	South African National Biodiversity Institute
UKZN	University of KwaZulu-Natal
WfWetlands	Working for Wetlands
WRC	Water Research Commission

The WET-Management Series: WET-Roadmap

The WET-Roadmap is an overview of, and guide to, the WET-Management Tools. It includes a brief outline of the documents and tools in the WET-Management series and describes how they inter-relate. It also provides an index to the wetland rehabilitation tools, including reference to specific sections where relevant.

Assessment and implementation methods for wetland management and rehabilitation

The WET-Management Series is a set of integrated tools that can be used to guide well-informed and effective wetland management and rehabilitation.

Wetland loss in South Africa has been significant and the need for wetland rehabilitation as part of good wetland stewardship and management is compelling. National policy and legislation provide clear direction and support for rehabilitation, but the very complex links between people and wetlands mean that actions aimed at sustainably rehabilitating and conserving wetlands will depend on the dedication and commitment of all stakeholders, especially landowners and wetland users.

The WET-Management tools are designed to be used at different spatial and institutional levels as needed, from national and provincial to the level of specific wetland sites involving individual landowners, in order to meet a range of wetland management and rehabilitation needs. Although they are designed primarily for guiding wetland rehabilitation work in South Africa, they can be applied to a wide range of other purposes. For example, some tools are used to assess

wetland health and ecosystem services.

Others can be used to foster wise wetland management and develop understanding of the driving forces behind the formation and degradation of wetlands. They are also of enormous value for education and training.

The WET-Management Series is the product of the Wetland Rehabilitation component of the National Wetlands Research Programme, an initiative of the Water Research Commission (WRC). The first phase of this programme, focusing on wetland rehabilitation, was jointly funded by the commission and the Department of Environmental Affairs and Tourism (DEAT), through the South African National Biodiversity Institute (SANBI) which is the home of the Working for Wetlands programme. Other key partners include the Department of Water Affairs and Forestry (DWAF), Department of Agriculture (DoA), Mondi Wetlands Project, provincial conservation agencies, universities and private enterprise. The research programme's second phase, *Wetland Health and Integrity*, will add new tools to the WET-Management Series. Phase Three, *Wise Use of Wetlands*, is focussed on how wetlands benefit people and how those benefits can be derived sustainably.



What does the WET-Management Series offer?

The tools offer a sound scientific basis for planning, implementing and evaluating wetland rehabilitation, providing guidelines to:

- Develop an overall planning framework (*WET-RehabPlan*)
- Assess the condition of catchments and individual wetlands (*WET-Health*)
- Assess the functions and values of individual wetlands (*WET-EcoServices*)
- Evaluate the need for rehabilitation (*WET-Prioritise* and *WET-Legal*)
- Identify why wetlands degrade and what rehabilitation interventions are appropriate (*WET-Origins* and *WET-Methods*)
- Guide the selection and implementation of rehabilitation methods (*WET-Methods*)

- Monitor the success of rehabilitation projects (*WET-Rehab-Evaluate* and *WET-EffectiveManage*).

The tools are centred on *WET-RehabPlan*, which directs users to appropriate tools at appropriate times during the planning and implementation process. *WET-RehabPlan* is used across all scales, *WET-Prioritise* primarily at national to catchment scales, *WET-EcoServices* and *WET-Health* at intermediate and fine scales (catchments to individual wetlands), and the other tools at a fine scale (rehabilitation interventions in individual wetlands). The tools do not need to be used in any order; users are encouraged to find relevant material by consulting the index presented as part of this tool.




Why are wetlands valuable?

Wetlands are fascinating and dynamic ecosystems that provide indispensable ecosystem services. The National Wetland Inventory has mapped over 120,000 wetlands, ranging greatly in size and value and accounting for about 7% of South Africa's surface area. Commonly referred to as marshes, swamps, bogs or vleis, they occur in a variety of settings but share the common features outlined in the definition contained in the National Water Act (NWA). They support a range of specialised plant, insect, bird and mammal life and also supply wild food, grazing, building and craft materials to people. They absorb flood waters, improve water quality and regulate streamflow, helping to maintain ecosystem functioning downstream. Different wetland types supply different ecosystem services. Floodplains, for

example, are generally very effective in reducing the severity of floods. Another important wetland type in South Africa is the unique coastal peat swamp forests of Maputaland, which support unusual plant and animal communities and also play a special role in maintaining other aquatic ecosystems such as the Maputaland freshwater lakes and Lake St Lucia.

In many parts of South Africa where soils are poor and rainfall is low, wetlands are important sites for small-scale subsistence agriculture, but it is critical that farming practices are conducted in a way that does not degrade wetlands by inhibiting their functioning. Many culturally and economically important species are found in wetlands, including wild food, craft and medicinal plants that are important for rural communities.



The National Water Act defines wetlands as:

'land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which in normal circumstances supports or would support vegetation typically adapted to life in saturated soils.'

This is the definition used by the WET-Management series.



Why rehabilitate wetlands?

Because wetlands are transitional between aquatic and terrestrial ecosystems, they are vulnerable to impacts on both. In addition to direct impacts such as draining for pastures and crops or the construction of infrastructure such as roads that impede and concentrate water flow, there are also severe ongoing impacts from pollution and erosion in catchments, excessive water abstraction, loss of vegetation cover, climate change and land use change. Many of South Africa's wetlands are already lost because of agriculture, timber plantations, mining and urban development. Although no systematic national survey of wetland loss has been undertaken in South Africa, studies in several major catchments have revealed that between 35% and 60% of the wetlands, and the benefits they provide, have already been lost or severely degraded. But degradation is not necessarily permanent, and international and South

African experience has shown that it is possible to recover some of the health and values of degraded wetlands through rehabilitation.

Effective wetland conservation strategies combine wetland protection and wise use with wetland rehabilitation to address past degradation. In South Africa both of these measures are being increasingly expressed through a range of policy and legislative frameworks, particularly within the environment and water sectors. Legislation of the departments of Environmental Affairs and Tourism (DEAT), Water Affairs and Forestry (DWAF), and Agriculture (DoA) protects wetlands and encourages their rehabilitation. Furthermore, several national policies and programmes and multilateral agreements to which South Africa is a party have incorporated the two-pronged approach of maintaining healthy wetlands while rehabilitating degraded ones.



What is wetland rehabilitation?

When a wetland is damaged or degraded it usually can no longer provide all the goods and services it supplied when it was in good condition, such as water purification, flood attenuation, or acting as a source of reeds for craft production and grazing for livestock. But if the wetland is returned to a healthy state, some or even all of these services can be recovered.

Wetland rehabilitation is the action taken to reverse or halt the decline of the health of the ecosystem, by recovering the former or desired ecosystem structure, function, biotic composition and/or ecosystem services. This is typically done by intervening to re-instate the driving forces – hydrological, ecological and geomorphological – that characterise wetlands, through measures such as:

- the building of concrete, earth or gabion structures to arrest erosion, trap sediment and resaturate drained wetland areas
- using structures and landscaping to reinstate diminished flood mitigation and water quality enhancement functions

- plugging of artificial drainage channels
- addressing offsite causes of degradation, such as inappropriate agricultural practices
- re-vegetation and bio-engineering
- eradicating invasive alien plants
- raising awareness of wetlands among workers, landowners and the public
- providing technical skills, and
- developing management plans for the rehabilitated wetlands.

It is important to bear in mind that wetlands are dynamic ecosystems, which makes it difficult to predict precisely how they may respond to particular rehabilitation interventions. It is therefore wise to try to understand the causes of degradation so that rehabilitation addresses the cause of degradation and not just the symptoms. Furthermore, rehabilitation should be viewed as a process rather than an end goal in itself. As far as possible, solutions to wetland degradation should work in harmony with natural processes so that follow-up work is minimised and sustainability is enhanced.



Principles that guide successful wetland rehabilitation

- Protection, wise use and rehabilitation of wetlands go hand in hand. Rehabilitation is only a last measure, and not an excuse for destructive use.
- Ensure that the rehabilitation objectives and measures that are set complement and support how the wetland functions.
 - Rehabilitation is the re-instatement of the driving forces that underlie wetlands, especially hydrology.
 - Wetlands are naturally dynamic. Instead of trying to maintain the wetland in a static state, rather aim for a persistent and resilient system that can maintain itself and respond to change.
- When selecting a wetland for rehabilitation, consider its role in its broader catchment and landscape, and ensure that rehabilitation complies with existing catchment objectives and biodiversity conservation planning.
- Address both the causes and symptoms of wetland degradation.
- When planning rehabilitation, consult openly and comprehensively, and incorporate the contributions of landowners, land users and other key stakeholders such as municipal bodies or provincial departments who will also benefit from the rehabilitation.
- Set clear, measurable objectives and develop your rehabilitation plans with a multidisciplinary team that includes expertise in ecological functioning and expertise in design of rehabilitation structures.
- A long term stewardship approach is vital. Rehabilitation work is more successful when the owners and users of the wetland commit to sustaining its health through wise use.



Mondi Wetlands Project

**Wetland hydro-geomorphic
(HGM) types used in the
WET-Management Series**



Floodplain



Un-channelled
valley bottom



Hillslope seepage linked
to a stream channel



Depression



Channelled valley bottom



Un-channelled valley bottom



Isolated hillslope seepage



Although all wetlands share common features, in different landscape settings water passes through the wetland in different ways, which means that different hydro-geomorphic wetland types can be recognised.

Overview of the WET-Management Series: **BACKGROUND READING**

The series includes documents that provide background information about wetlands and natural resource management as well as tools that can be used to guide decisions around wetland management.

WET-Origins

WET-Origins describes the remarkable geological and geomorphological processes that give rise to wetlands in South Africa, and provides a background description of:

- The geology, geomorphology, climate and drainage of southern Africa
- An introduction to wetland hydrology and hydraulics
- Geomorphic controls on different wetland types
- Wetland dynamics due to sedimentation and erosion.

It incorporates this understanding into a methodology that can be used to help develop insight into the hydrological and geomorphological factors that govern why a wetland occurs where it does, which is useful when planning rehabilitation.

WET-ManagementReview

WET-Management Review has four parts:

- An assessment of effectiveness at programme level, including:

- a national overview of land-uses affecting the status of wetlands and the institutional environment that affects wetlands; and
- an overview of 5 natural resource management programmes affecting wetlands and their impact in different land-use sectors; Working for Wetlands, Working for Water, LandCare, the Crane Conservation Programme of the Endangered Wildlife Trust, and the Mondi Wetlands Project.
- An assessment, using *WET-EffectiveManage*, of the management effectiveness of 21 wetland sites in a variety of different land-use and land-tenure contexts.
- An assessment of stakeholder participation in wetland rehabilitation at six wetland sites.
- A framework for assessing the effectiveness of collaboration between partners, described and applied to a site where a rehabilitation project has been underway for several years.



WET-Roadmap

WET-Roadmap provides an introduction to the WET-Management Tools and includes:

- A brief outline of the documents and tools in the WET-Management series and how they inter-relate
- An index including reference to specific sections in the relevant tools.

WET-RehabPlan

WET-RehabPlan offers a process that can be followed to develop comprehensive wetland rehabilitation plans. It has three main elements:

- Introduction to rehabilitation, planning and stakeholder involvement
- General principles to follow in planning wetland rehabilitation
- Step-by-step guidelines for undertaking the planning and implementation of wetland rehabilitation at a range of scales from national/provincial to catchment to local. It directs the user to the right tools and sections at appropriate points in the rehabilitation process.

Good planning ensures a rational and structured approach towards rehabilitation as well as a clear understanding of the reasons for rehabilitation, the actions and interventions required, and the benefits and beneficiaries.

WET-Prioritise

WET-Prioritise helps to identify where rehabilitation should take place once the objectives of rehabilitation are identified. It works at three spatial levels. At national and provincial level, an interactive GIS modelling tool assists in identifying priority catchments by

evaluating a range of scenarios, based on different combinations of 13 socio-economic and bio-physical criteria (e.g. Biodiversity Priority Areas, High Poverty Areas). Once a catchment is selected, the tool helps to identify areas for rehabilitation within that catchment. Finally, individual wetlands are selected based on the predicted cost-effectiveness and sustainability of rehabilitation.

WET-Prioritise provides step-by-step guidelines applicable at all three spatial scales, including:

- Identifying objectives and an appropriate scale
 - Developing prioritisation criteria
 - Applying the criteria, usually in a two step process of rapidly screening all candidate sites to arrive at a preliminary set of sites, from which individual priority sites are selected.
- Three case examples of prioritisation are described.

WET-Legal

WET-Legal presents South African legislation that is relevant to wetland rehabilitation, including the Conservation of Agricultural Resources Act (CARA), National Environmental Management Act (NEMA), and National Water Act (NWA), as well as relevant international agreements such as the Ramsar Convention on Wetlands. *WET-Legal* lists the environmental impacts potentially associated with typical wetland interventions and the legislative provisions that apply to each of these impacts. It also covers laws compelling rehabilitation and the legal responsibilities of different parties involved in rehabilitation.

WET-Ecoservices

WET-EcoServices is used to assess the goods and services that individual wetlands provide, thereby aiding informed planning and decision-making. It is designed for a class of wetlands known as palustrine wetlands (i.e. marshes, floodplains, vleis or seeps). The tool provides guidelines for scoring the importance of a wetland in delivering each of 15 different ecosystem services (including flood attenuation, sediment trapping and provision of livestock grazing). The first step is to characterize wetlands according to their hydro-geomorphic setting (e.g. floodplain). Ecosystem service delivery is then assessed either at Level 1, based on existing knowledge or at Level 2, based on a field assessment of key descriptors (e.g. flow pattern through the wetland).

WET-Health

WET Health assists in assessing the health of wetlands using indicators based on geomorphology, hydrology and vegetation. For the purposes of rehabilitation planning and assessment, WET-Health helps users understand the condition of the wetland in order to determine whether it is beyond repair, whether it requires rehabilitation intervention, or whether, despite damage, it is perhaps healthy enough not to require intervention. It also helps diagnose the cause of wetland degradation so that rehabilitation workers can design appropriate interventions that treat both the symptoms and causes of degradation. *WET-Health* is tailored specifically for South African conditions and has wide application, including assessing the Present Ecological State of a wetland for purposes of Ecological Reserve determination in terms of the National Water Act, and for environmental

impact assessments. There are two levels of complexity: Level 1 is used for assessment at a broad catchment level and Level 2 provides detail and confidence for individual wetlands based on field assessment of indicators of degradation (e.g. presence of alien plants). A basic tertiary education in agriculture and/or environmental sciences is required to use it effectively.

WET-EffectiveManage

WET-EffectiveManage provides a framework that can be used to assess management effectiveness at individual wetlands based on 15 key criteria (e.g. the extent to which a regularly reviewed management plan is in place for the wetland). A scoring system is provided for rapidly assessing the criteria.

WET-RehabMethods

WET-RehabMethods is used to guide the selection and implementation of rehabilitation methods that are appropriate for the particular problem being addressed and for the wetland and its catchment context. It provides detailed practical rehabilitation guidelines for inland palustrine wetlands and their catchments, and focuses particularly on wetlands associated with natural drainage networks. It can be adapted to meet specific needs. Some aspects of the tool require high levels of civil engineering expertise, but it is designed primarily for rehabilitation workers who have completed training in soil conservation, life sciences or engineering at a diploma level or higher, and who have practical field experience.

WET-RehabMethods includes the following:

- Key concepts relating to wetland degradation, particularly that resulting from erosion
- Guidelines for the selection of an

appropriate type of rehabilitation intervention (including both “soft” and “hard” engineering options)

- Detailed guidance provided for designing a wide variety of intervention types (e.g. determining an adequate spillway to account for runoff intensity)
- Detailed guidance provided for the implementation of the different intervention types.

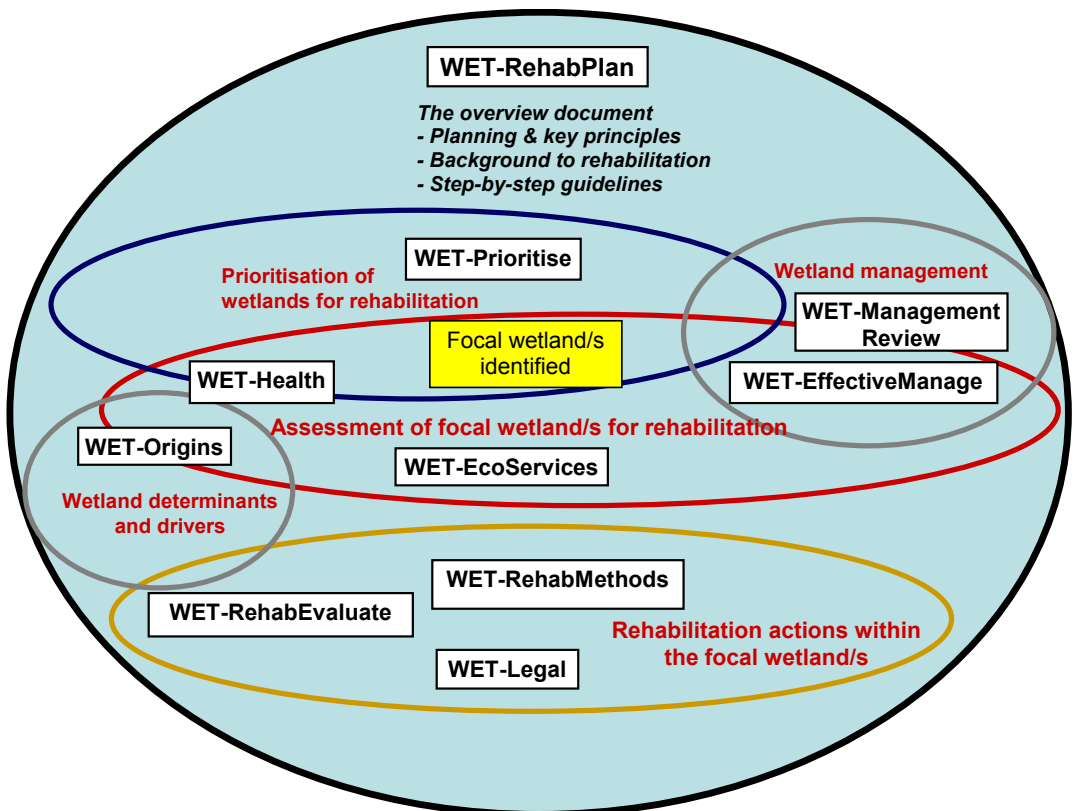
WET-RehabEvaluate

WET-RehabEvaluate is used to evaluate the success of rehabilitation projects, and is designed with the understanding that monitoring and evaluation are closely tied to planning, which, in turn, should accommodate monitoring and

evaluation elements. WET-RehabEvaluate provides the following :

- Background to the importance of evaluation of wetland rehabilitation projects
- Step-by-step guidelines for monitoring and evaluation of rehabilitation projects, both in terms of project outputs and outcomes. The outcomes are based on system integrity and the delivery of ecosystem services, and therefore results from WET-Health and WET-EcoServices are included. The guidelines include: review project objectives, identify performance indicators and standards, develop and implement a monitoring and evaluation plan, evaluate and report on performance.

How do the WET-Management tools relate to each other in a rehabilitation context?



WET-Tools to use at different stages of planning and implementing rehabilitation work		
National & Provincial Level	Who should be involved?	
	Step 1: Engage stakeholders & develop a vision	<i>WET-RehabPlan</i>
	Where should the work be done?	
	Step 2: Select priority catchments	<i>WET-Prioritise</i>
Catchment Level	Step 3: Engage stakeholders & develop a vision	<i>WET-RehabPlan</i>
	Step 4: Select priority candidate wetlands	<i>WET-Prioritise</i> <i>WET-EcoServices</i> <i>WET-Health</i>
	What should be done?	
Individual Wetland Site Level	Step 5A: Engage stakeholders & develop a vision	<i>WET-RehabPlan</i>
	Step 5B-E: Assess site, set objectives & determine feasibility	<i>WET-RehabPlan</i> <i>WET-Origins</i> <i>WET-Health</i> <i>WET-EffectiveManage</i>
	How should the work be done?	
	Step 5F-H: Design and cost rehabilitation interventions, and ensure legal compliance	<i>WET-RehabPlan</i> <i>WET-RehabMethods</i> <i>WET-Legal</i>
	How do we know that the work has achieved?	
	Step 5I-J: Implementation, monitoring and evaluation and follow-up	<i>WET-RehabPlan</i> <i>WET-RehabEvaluate</i>



Relevance of the components of the WET-Management Series

Potential users	WET-Origins	WET-Management Review	WET-RehabPlan	WET-Prioritise	WET-Effective Manage	WET-Legal	WET-Rehab Methods	WET-Eco-Services	WET-Health	WET-Rehab-Evaluate
Rehabilitation planning - wetland specialist										
Rehabilitation planning - engineer		Part 1	Step 5							
Rehabilitation programme coordination - national										
Rehabilitation programme coordination - provincial										
Rehabilitation implementation			Step 5							
Impact assessment		Part 1						1	2	
Wetland management										
Ecological Reserve Determination - DWAF officials & consultants		Part 1						1	2	
Catchment planners - CMAs and others		Part 1								
Broad-scale biodiversity conservation planning		Part 1								

The tool is likely to have some relevance

The tool is likely to have a very high level of relevance

1. WET-Ecoservices is of particular relevance to determining the Ecological Importance and Sensitivity (EIS) of a wetland.
2. WET-Health is of particular relevance to determining the Present Ecological State (PES) of a wetland.

Index¹

- Adaptive management
 - WET-ManagementReview* (Prt. 2) 1.2
- Aesthetic issues
 - WET-Legal 2*
- Aftercare
 - WET-RehabPlan* 1.6
 - WET-RehabMethods* Ch. 25, 29.9, Ch. 30
- Alien plants
 - WET-Health* App. 4.1 of 4
- Assessment, health
 - WET-Health*
- Best management practice
 - WET-RehabMethods* App. 4
- Bioengineering
 - WET-RehabMethods* Ch. 6
- Canalisation (See '*Drains, artificial*')
- Catchment, impacts
 - WET-Health 2* (Step 2)
 - WET-Origins* 11.4
- Catchment management,
- Catchment management agencies
 - WET-RehabPlan* 3.4
- Choosing a method to use
 - WET-RehabMethods* 4.1, 6.6, Ch. 11
- Climate
 - WET-Origins* 5.1
- Climate change
 - WET-Origins* 5.2
- Collaboration
 - WET-RehabPlan* 1.6
 - WET-ManagementReview* (Prt. 4); 1.2, 1.4, 1.5
- Concrete
 - WET-RehabMethods* 13.2, 21.1
- Corrective actions
 - WET-RehabEvaluate* 11.1.3
 - WET-RehabMethods* Ch. 30, App. 4
 - WET-RehabPlan* 3.14
- Cost-effectiveness of rehabilitation
 - WET-RehabPlan* 3.10.2, 3.11
 - WET-RehabMethods* 21.5, 27.3
- Deposition of sediment
 - WET-Origins* 11.1, 11.2
 - WET-Health 3*
- Design of project
 - WET-RehabPlan* 3.11
- Disturbance
 - WET-Health 4*
- Ditches (See '*Drains, artificial*')
- Donga (See '*Erosion, gully*')
- Drains, artificial
 - WET-Health 2* (Step 3A)
 - WET-RehabMethods* 8.1, 8.2
- Ecosystem services
 - WET-EcoServices*
 - WET-RehabPlan* 1.1
- Equilibrium slope
 - WET-Origins* 10.4.1
- Erosion, control/ halting of
 - WET-RehabMethods* Ch. 3, 4.1, 4.2
- Erosion, gully
 - WET-Health 2* (Step 3A), 3 (Step 2A)
 - WET-Origins* 10.3
- Erosion and deposition
 - WET-Origins* Ch. 10
- Evaluation, project (See '*Monitoring & evaluation*')
- Feasibility
 - WET-RehabPlan* 3.10.2
- Gabions
 - WET-RehabMethods* 21.2, 8.2 of App. 4
- Geology, geological controls
 - WET-Origins* Ch. 3, Ch. 9
- Geomorphic evolution
 - WET-Origins* Ch. 10
- Geomorphology, geomorphological controls
 - WET-Origins* Ch. 4, Ch. 12
- GIS tool for prioritising wetlands
 - WET-Prioritise 2* (Step 6), App. 1, App. 2
- Graded stream
 - WET-Origins* 7.2, 7.3
- Groundwater
 - WET-Origins* 6.3, 6.5, 8.3
- Gully stabilisation
 - WET-RehabMethods* 4.3, Ch. 7, Ch. 9
- Headcuts, erosion (See '*Erosion, gully*')
- Health, assessment procedure
 - WET-Health* 1.3
- Health, definition
 - WET-Health* 1.1.1
- Hectare equivalents (of intact wetland)
 - WET-RehabPlan* 3.9
 - WET-RehabEvaluate* 11.2.1, 12.8.2
- HGM (Hydro-geomorphic) units
 - WET-Health* 1.2.3
 - WET-Origins* 11.2
- Hillslope hydrology
 - WET-Origins* 6.4
- Hydraulics
 - WET-Origins* 6.2, Ch. 8
 - WET-RehabMethods* Ch. 17
- Hydrology
 - WET-Health 2*
 - WET-Origins* Ch. 6, Ch. 7, Ch. 8
- Hydroperiod
 - WET-Origins* 8.2
- Impacts (environmental) of rehabilitation (See '*Rehabilitation, potential impacts of*')
- Impacts (health) on wetlands
 - WET-Health* 1.2.4
- Importance of wetlands
 - WET-RehabPlan* 1.1
 - WET-EcoServices*

Index (continued)

- Indicators, health
 - WET-Health* 1.1.1, 1.1.4
- Institutional factors
 - WET-ManagementReview* (Prt 1) 3, (Prt 2) 1.2
 - WET-RehabPlan* 3.6
- Integrity of structures
 - WET-RehabMethods* Ch. 30
- Invasive plants
 - WET-Health* App. 4.3 of 4
- Land use in catchments
 - WET-RehabMethods* 2.1, Ch. 5
 - WET-Health* 2 (Step 2)
- Land use in wetlands
 - WET-Health* 2 (Step 3), 4
- Landowner agreements
 - WET-RehabPlan* 3.12
 - WET-Legal* 5.1.2
- Landowner responsibility
 - WET-RehabPlan* 3.12.2, 3.12.3
 - WET-Legal* 5.1.2
- Legal authorisations
 - WET-RehabPlan* 3.12.3
 - WET-Legal* 1 (2)
- Legal compliance
 - WET-Legal*
- Legal responsibility, users
 - WET-Legal* 1 (5)
- Liability, legal
 - WET-Legal* 1 (6)
- Maintenance (of rehabilitation interventions)
 - WET-RehabPlan* 3.10.2, 3.14
 - WET-RehabMethods* Ch. 30
- Management effectiveness
 - WET-ManagementReview* (Prt. 2)
 - WET-RehabPlan* 3.6
- Monitoring, frequency and timing
 - WET-RehabEvaluate* 9.2
- Monitoring, levels of
 - WET-RehabEvaluate* 8
- Monitoring and evaluation
 - WET-RehabPlan* 3.13
 - WET-RehabEvaluate*
- National Environmental Management Act (NEMA)
 - WET-Legal* 1.3.1, 3.1, 4.1, 5.1
- National Water Act (NWA)
 - WET-Legal* 1.3.2, 2.2, 3.6, 4.2, 5.3
- Objectives, achievement of
 - WET-RehabEvaluate* 5.1, 5.2
 - (See also 'Performance evaluation')
- Objectives, setting for a project
 - WET-RehabPlan* 3.8, 3.10.2
- Outputs and outcomes
 - WET-RehabPlan* 3.1, 3.9, 3.13.3
- Partnerships
 - WET-ManagementReview* (Prt. 3)
 - WET-RehabPlan* 1.6
- Performance evaluation
 - WET-RehabEvaluate* 2, 3, 12
 - WET-RehabPlan* 3.1, 3.9, 3.13.3
- Performance indicators
 - WET-RehabEvaluate* 6
- Planning
 - WET-RehabPlan* 1.4, 3
- Planning, a framework
 - WET-RehabPlan* 3
- Planning, principles
 - WET-RehabPlan* 2
 - WET-Origins* Ch. 13
- Policy context
 - WET-RehabPlan* 1.1, 1.3, 1.5
- Present State (of the wetland)
 - WET-Health* 1.2.5, 2 (Step 7), 3 (Step 2, Step 3)
- Prioritisation, catchment
 - WET-Prioritise* (Step 6)
 - WET-RehabPlan* 3.3
- Prioritisation, wetland
 - WET-Prioritise* 2 (Step 6)
 - WET-RehabPlan* 3.5
- Problem diagnosis
 - WET-RehabPlan* 3.7
- Programmes involved in wetland management
 - WET-ManagementReview* (Prt. 1)
- Project design
 - WET-RehabPlan* 3.11
- Project implementation
 - WET-RehabPlan* 3.12, 3.14
- Public participation
 - WET-ManagementReview* (Prt. 3)
 - WET-RehabPlan* 1.6, 2, 3.2, 3.6
- Ramsar Convention
 - WET-Legal* 1.1
- Rehabilitation, activity of necessity
 - WET-Legal* 1 (4)
- Rehabilitation, definition
 - WET-RehabPlan* 1.2
- Rehabilitation, legal compulsion
 - WET-Legal* 1 (3)
- Rehabilitation, planning
 - WET-RehabPlan* 1.4
- Rehabilitation, potential impacts of
 - WET-RehabPlan* 3.10
 - WET-Legal* 2
 - WET-RehabMethods* 4 of App. 4
- Rehabilitation, South Africa
 - WET-RehabPlan* 1.3, 1.5
- Rehabilitation, sustainability
 - WET-RehabPlan* Sec. 1.5
- Rehabilitation, user's responsibility
 - WET-Legal* 1 (5)
 - WET-RehabPlan* 1.6, 3.12

Index (continued)

- Rehabilitation and governance
 - WET-RehabPlan* 1.5
- Rehabilitation and wetland functions
 - WET-RehabPlan* 3.9
 - (See also 'Ecosystem services')
- Rehabilitation and wetland health
 - WET-RehabPlan* 3.9
- Rehabilitation plans
 - WET-RehabPlan* 3
- Remedial action (See 'Corrective actions')
- Reporting on monitoring and evaluation
 - WET-RehabEvaluate* 13
- Return on investment
 - (See 'Cost-effectiveness of rehabilitation')
- Risks, minimizing risks
 - WET-RehabMethods* 5 of App. 4
 - WET-RehabPlan* 3.11, 4.12.1
- Rivers and streams
 - WET-Origins* Ch. 7
- Roles and responsibilities, setting
 - WET-RehabPlan* 1.6, 3.12
- Ruderal (weedy) plants
 - WET-Health* App. 4.2 of 4
- Runoff
 - WET-Health* 2 (Step 2)
- Runoff intensity (Q), estimation of
 - WET-RehabMethods* 3.5, Ch. 15, App. 4
- Scale and prioritisation
 - WET-Prioritise* 2 (Step 2)
 - WET-RehabPlan* 3.3, 3.5
- Screening of candidate sites
 - WET-Prioritise* 2 (Step 5)
 - WET-RehabPlan* 3.5
- Sediment
 - WET-Origins* 7.1
- Social outputs
 - WET-RehabEvaluate* 11.1.4
- Spillways
 - WET-RehabMethods* 13.1, Ch. 18: 19.1
- Stakeholder engagement and public participation
 - WET-RehabPlan* 1.6, 3.2, 3.4, 3.6, 3.10
 - WET-ManagementReview* (Prt. 3)
- Stream order
 - WET-Origins* 7.5
- Success standards
 - WET-RehabEvaluate* 7
- Surface water-groundwater interactions
 - WET-Origin* 7.4, 8.3
- Synergy (See 'Collaboration')
- Trajectory of change (See 'Wetland health')
 - WET-Health* 1.2.6; 2 (Step 6);
 - WET-Health* 3 (Step 4C); 4 (Step 4)
- Vegetation, integrity
 - WET-Health* 4
- Vegetation, wetness indicator categories
 - WET-Health* App. 4.1, 4.2 of 4
- WET-Roadmap*
- Vegetation establishment
 - WET-RehabMethods* 6.2, 6.3
- Vision, developing a
 - WET-RehabPlan* 3.2, 3.4
- Vulnerability, geomorphic
 - WET-Health* 3 (Step 4)
- Water flow control (See 'Spillways')
- Water quality and wetland health
 - WET-Health* 7
- Weirs
 - WET-RehabMethods* Ch. 11, Ch. 18, Ch. 21, 8.2 of App. 4
- Wetland classification
 - WET-Origins* Ch. 2, Ch. 11
- Wetland degradation
 - WET-ManagementReview* Prt. 1
 - WET-RehabPlan* 1.1
 - WET-RehabMethods* Ch. 2
- Wetland dynamics
 - WET-Origins* Ch. 11
 - WET-RehabPlan* 2
- Wetland functions (See 'Ecosystem services')
- Wetland integrity
 - WET-Health*
- Wetland values and valuation
 - WET-EcoServices*
- Wetness zones, soil
 - WET-Origins* 8.2
- Wise use, sustainable use
 - WET-ManagementReview* Prt. 2
- Working for Wetlands
 - WET-ManagementReview* Prt 2; 4, 5.1, 6
 - WET-RehabPlan* 1.3
- Workplans
 - WET-RehabPlan* 3.12.1
 - WET-RehabMethods* 4.7, 4.8

¹Key to Abbreviations

Prt.(Part); Ch.(Chapter); App.(Appendix)

