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Resource Directed Management of Water Quality

Volume 2.1

Summary Strategy

August 2006

Edition 1

water & forestry

Department:
Water Affairs & Forestry
REPUBLIC OF SOUTH AFRICA

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EXECUTIVE SUMMARY

"Making water resource management water quality friendly"

Policy implementation

This strategy provides the general implementation plan for the resource directed management of water quality policy ("the Policy") (DWAF, 2005a). It describes "who should do what by when" and is presented in a way that explicitly links the Policy and its principles with specific management approaches and instruments to facilitate its practical implementation.

Sustainable development

The link between the adaptive "Plan-Implement-Check-Review" cycle of Integrated Water Quality Management (IWQM) and sustainable development is described as well as how this plays out at various levels (varying from short-term to long-term).

An approach to balancing the principles of sustainable development is also proposed. In particular, how this should be done to achieve socio-economic development is presented. An example is also presented of how strict protection of ecosystems can be achieved where appropriate. A simple familiarisation plan for inexperienced practitioners is also proposed.

Institutional arrangements

How the institutions will evolve during the phased decentralisation of water management roles and responsibilities from the Department to Clusters and catchment management agencies (CMAs) is described. Specific challenges and institutional implications are identified. The phases include:

- Phase 1: Post restructuring (current,
- Phase 2: Decentralisation to Clusters,
- Phase 3: CMAs establishment, and
- Phase 4: Fully functional CMAs.

Roles and responsibilities within the Department for IWQM management functions are presented as well as roles played by external stakeholders, and local, regional and national government departments.

The various facets of institutional capacity are also identified.

Summary strategies

Summary strategies are provided for a series of well-defined scenarios. In each case, the reader is (a) referred to associated enabling principles in the Policy and (b) provided with references to guidelines and further reading that will provide the necessary detail.

Scenarios include:

- Catchment assessment,
- Catchment visioning,
- Determining resource directed measures (RDM), including addressing issues of confidence, and water quality variables of concern, and

- Giving effect to RDM, including developing catchment management strategies, attaining a management class, maintaining a management class, managing point and non-point sources, water use authorisation, long-term non-compliance with resource quality objectives (RQOs), non-compliance with licence conditions and remediation.

Water quality monitoring is also addressed.

Capacity creation and maintenance

Capacity creation for the short-term and long-term as well as internal and external to DWAF is described. The short-term strategy focuses on empowering external stakeholders and creating knowledgeable DWAF staff. The long-term strategy focuses on adapting to changing external stakeholder demands (for awareness and empowerment) and refining and improving the capabilities of DWAF staff. The ultimate aim is to facilitate creation of a learning institution in which appropriate knowledge is created.

A three-dimensional approach to empowering DWAF staff for sustainable management is also proposed (objective empowerment, competence, and subjective empowerment).

Action Plan

An immediate action plan is proposed to "kick start" appropriate data collection and information generation in support of resource directed management of water quality. It is based on defining resource water quality objectives (RWQOs) in priority catchments that can begin to generate nationally consistent water quality information in anticipation of determination of RQOs when the classification system is developed.

The development of a detailed capacity creation plan is also recommended.

Management approaches

A brief summarised description is also provided (in the appendix) of management approaches available to IWQM practitioners. These include:

- Regulatory (general authorisations, command-and-control – *ad hoc* licensing, compulsory licensing, RQOs, Reserve, directives, etc. – , and economic – pricing strategy, waste discharge charge system), and
- Non-regulatory (civil society, self-regulatory, and supportive).

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ACRONYMS

CMAs	Catchment Management Agency
CMS	Catchment Management Strategy
CSD	Committee for Sustainable Development
DBSA	Development Bank of South Africa
DEAT	Department of Environmental Affairs & Tourism
DME	Department of Minerals & Energy
DoA	Department of Agriculture
DTI	Department of Trade & Industry
DWAF	Department of Water Affairs & Forestry
ECA	Environment Conservation Act
EMS	Environmental Management System
EMPR	Environmental Management Plan Report
IDPs	Integrated Development Plan
ISO	International Organization for Standardization
ISP	Internal Strategic Perspective
IWQM	Integrated Water Quality Management
IWRM	Integrated Water Resource Management
NQF	National Qualifications Framework
NWA (36:1998)	National Water Act
NWRS	National Water Resource Strategy
P&R	Policy and Regulation
PGDS	Provincial Growth and Development Strategy
PSIR	Pressure-State-Impact-Response
RDM	Resource Directed Measures
RDMWQ	Resource Directed Management of Water Quality
RO	Regional Office (DWAF)
RQOs	Resource Quality Objective
RWQOs	Resource Water Quality Objective
SAQA	South African Qualifications Authority
SDCs	Source Directed Controls
SMO	Source Management Objective
WDCS	Waste Discharge Charge System
WMIs	Water Management Institutions
WQ	Water Quality
WQM	Water Quality Management
WRM	Water Resource Management
WSDPs	Water Services Development Plan

SECTION 1: SUMMARY STRATEGY

1.1 Introduction

The objective of this strategy is the implementation of the resource directed management of water quality policy ("the Policy") (DWAF, 2005) of the Department of Water Affairs and Forestry ("the Department"). It addresses "who should do what by when", explicitly linking the Policy to management approaches and management instruments to facilitate its practical and pragmatic implementation. It is also the intention that, in some contexts, this strategy presents a first level of interpretation of the policy.

Simultaneous review of this strategy with the Policy every five years in respect of objectives and effectiveness is recommended.

1.2 Sustainable development

1.2.1 Integrated water quality management

Integrated water quality management should be implemented in a cyclical process aimed at continual improvement (fundamental to the principle of adaptive management). This cycle occurs at a number of different levels. They range from individual (local) source and resource management initiatives (short-term) through re-consideration of the catchment management strategy (medium-term) to re-consideration of the resource directed measures and vision (long-term).

The principles of sustainable development apply at all stages. However, the designated resource management class is the 'first line of defence' against development that is unsustainable. The 'second line of defence' is embodied in the catchment management strategy and its implementation through resource directed measures, individual source directed controls and resource management initiatives.

1.2.2 Balancing the principles

The emphasis placed by the Policy on socio-economic development means that particular attention must be paid to the principles of current equitable access, optimal water use and environmental integration.

Current equitable access is achieved by first determining the Reserve and then allocating water quality to national priorities. The remainder is then allocated equitably, and with emphasis on optimal water use, to other users. Less emphasis is given to protection of water resources by accepting some degree of impact though not to the extent that the resource becomes unacceptably degraded and unsustainable.

When strict protection of water resources is warranted, the resource will typically be classified as Natural. In this case, it is the principles of protection of water resources, and by implication, equity between generations, that receive most emphasis. Importantly, this does not preclude other water uses. However, these water uses must be such that their impact on water quality is minimal and well within the ability of the ecosystem to sustain the provision of goods and services in order to maintain the management class.

As an example of how this emphasis might be applied, a related strategic national recommendation has been made in respect of freshwater biodiversity (DWAF, 2005n).

Balancing sustainable development principles is complex. To gradually increase the familiarity of practitioners with these principles, it is recommended that less experienced practitioners should first simply practice identifying what factors and actions refer to which principle. With experience, the explicit application of these principles in resource directed measures will become more evident.

1.3 Institutional arrangements

1.3.1 Phase institutional change

Institutional arrangements are dominated by transition to full decentralisation to catchment management agencies (CMAs) over four phases: *Phase 1* follows the recent restructuring of DWAF. Decision-making is shared between P&R and Regional Clusters, while systems are being developed and piloted. *Phase 2* is characterised by completion, or near-completion, of piloting and the establishment of stable macro-systems. As a result, further decision-making and implementation is transferred to the Regional Clusters, while the proto-CMAs take on those current regional cluster functions that centre on water use management and coordination. In *Phase 3* proto-CMAs are transferred, along with their functions and staff, from DWAF into the CMAs within the first 2 years. The CMAs are then formally established. In *Phase 4*, fully functional CMAs are established, with the majority of WRM implementation roles and responsibilities within the CMAs (including Responsible Authority functions).

1.3.2 Management effort

In Phases 1 and 2, management effort is reasonably evenly spread between P&R, Clusters and proto-CMAs. In Phase 3, with the establishment of the CMAs, all roles and responsibilities of the proto-CMAs are transferred to the CMAs along with a continuing shift of roles and responsibilities from P&R to Clusters to CMAs. P&R takes on new responsibilities centred on oversight and support – co-ordination, collaboration and transfer of information between CMAs, Clusters and P&R. In Phase 4, the CMAs is established and stabilised and now bears the majority of water quality management effort.

1.3.3 Institutional implications

Phases 2 and 3 will present the greatest challenges relating to capacity. Broad institutional capacity building will be required. When the CMAs become established, mentoring by DWAF and the Clusters will be particularly important.

1.3.4 Institutional roles

Water quality management inherently requires the management of activities and resources that are the mandate of other government departments or property of private sector entities. Key institutions include stakeholders, and local, regional and national government departments.

1.3.5 Institutional capacity

The process for building institutional capacity should (a) be carefully planned, and (b) establish coherent, simple and stable systems, introducing as much routine as available the capacity is able to deal with.

1.4 Implementation strategies

Resource directed management of water quality can occur in a very wide variety of contexts. The following sub-sections briefly summarise strategies in well-defined scenarios.

1.4.1 Catchment assessment

Catchment assessments should engage with stakeholders constructively, take cognisance of legislation such as the Promotion of Access to Information Act (2:2000), be appropriately integrative in their data collections and assessment, and be pragmatic in the allocation of financial and human resources according to the level of confidence required.

1.4.2 Catchment visioning

Catchment visioning is an indispensable component of this strategy and integrated water resource management in general. Although this strategy primarily addresses water quality management, visioning must encompass resource quality holistically and clearly identify how water quality issues contribute.

The context of the vision must be principle-based and should be the strategy to move towards the vision. Relevant legislation goes well beyond the National Water Act (36:1998). Stakeholders must be engaged in a way that (a) facilitates meaningful contributions, and (b) develops a sense of buy-in and, preferably, ownership. Catchment visioning initiatives should be carried out to a level of confidence appropriate to the circumstances.

1.4.3 Resource directed measures

1.4.3.1 General issues

The necessary degree of confidence required to determine of the management class, resource quality objectives (RQOs) and the Reserve must be determined by considering factors relating to:

- The immediate purpose of the RDM sub-process,
- The present ecological state,
- Potential changes in water quality, and
- Potential impacts of changes in water quality (*e.g.* relating to the ecological, social and economic sensitivity).

Appropriate water quality variables ('variables of concern') must be identified, which depend on:

- The nature of the individual water uses and their impacts,
- Ecosystem requirements, and
- The RQOs (both narrative and quantitative) that may exist.

The chosen variables must be:

- Representative of the water quality that matters the most to overall ecosystem health,
- Socially relevant and acceptable (*e.g.* relating to human health),
- Economically appropriate, and
- Institutionally sound and consistent across organisations.

1.4.3.2 Determining the resource management class and RQOs

Stakeholders must be empowered to make meaningful contributions. Specifically in respect of water quality, they must be sufficiently well-informed in respect of:

- The meaning and value of water quality in respect of (a) constituents, and (b) associated ecological responses and social and economic impacts of worsening water quality.
- The relationship between aquatic ecosystems and water quality, and
- The effects of their water uses on water quality and hence downstream users.

To facilitate integration across catchments, account must be taken of current and potential impacts upstream, downstream and on catchments receiving or donating water via inter-basin transfers.

Care should be taken to ensure that achievable RQOs (relating to water quality) are defined.

1.4.3.3 Giving effect to RDM

In general, the RDM need to be translated into strategies and actions that:

- Achieve the objectives set for the water resource,
- Manage causes of adverse impacts on water quality, guided by RQOs, resource water quality objectives (RWQOs) and source management objectives, the latter given effect through source directed controls (SDCs), and
- Remediate water resources where necessary.

The following sub-sections provide examples.

1.4.3.4 Catchment management strategies

The catchment management strategy (CMS) is the operational strategy that gives effect to RDM. The development of the CMS must be issues driven and aligned with Water Services Development Plans (WSDPs) and Integrated Development Plans (IDPs).

A water quality framework plan must form part of the CMS. It must include a water quality allocation plan that allocates the source management objective (SMO) load reductions (or increases) to priority sectors in the catchment. These must be based on resource water quality objectives (RWQOs) that support the attainment of RQOs.

1.4.3.5 Attaining a management class

In catchments that are stressed in respect of water quality, the first step is to establish a performance monitoring programme that quantifies the degree of stress. The strategy is primarily one of reactive management to minimise current impacts by engaging individual water users or responsible authorities. Specific management approaches include compulsory licensing, directives, strict regulation, prohibition of land use, remediation, waste discharge charge system, and encouraging general cooperation and awareness.

1.4.3.6 Maintaining a management class

In catchments that are unstressed in respect of water quality, allocatable water quality must still be sensibly distributed among water users, while taking due consideration of all the enabling principles of sustainable development. The strategy is mainly one of proactive management to ensure the water quality impacts of new developments are within the capacity of the water resource to absorb these inputs. Reactive management is likely to be necessary to ensure existing water users maintain their impacts on water quality within agreed limits. Regular assessment of monitoring data should be undertaken to determine when reactive management is necessary.

1.4.3.7 Managing point sources

The catchment management strategy will dictate the general nature of the required source directed controls. However, it is specifically the RQOs and RWQOs in place that determine the precise actions to be taken. Use of appropriate existing guidelines and Best Practices relating to the water use and, in particular, water resource protection should be encouraged, especially for new water users. The general strategy in respect of self-regulatory mechanisms is to encourage the adoption of ISO 14000 standards with the aim of increasing in-house responsible environmental management. New uses must be in accord with the catchment vision and associated RDM and can only be authorised if there exists allocatable water quality. After a licence is issued, a compliance monitoring programme must be established as soon as possible. However, complying with such licence conditions should never be regarded as guaranteeing attainment of RQOs.

1.4.3.8 Managing non-point sources

The overall management strategy is to place emphasis on improved management of the overall land use causing water quality impacts. In general, the approach used to manage the water quality effects of dense settlements should be used as a basis for dealing with non-point sources responsible for water quality problems. This entails engaging with the responsible authorities and reaching agreement on appropriate interventions.

1.4.3.9 Water use authorisation

The general strategy must be to streamline processing of water use authorisations, preferably using a simple screening protocol that will fast-track granting of water use authorisations when impacts are likely to be low.

The choice of end-of-pipe licence conditions relating to water quality for users discharging water containing waste into the water resource should depend on the degree of water quality stress. If the water resource has significant allocatable water quality (*i.e.* is not stressed or threatened), then end-of-pipe licence conditions can be based on effluent standards, although the applicant will typically not be allocated all that is available.

If the water resource is only slightly unstressed (*i.e.* threatened), then end-of-pipe licence conditions can be based on at least the following considerations:

- End-of-pipe effluent uniform national minimum requirements or standards (should they exist).
- End-of-pipe effluent targets back-calculated from downstream RWQOs or RQOs (DWAF, 2005j).

Effective use must be made of available software decision support (*e.g.* DWAF, 2005m).

1.4.3.10 Long-term non-compliance with RQOs

The following strategy should be applied when there is consistent non-achievement of RQOs over long periods (five years). First, the appropriateness of the source directed controls should be investigated. For example:

- Consider whether (a) National Water Act Schedule 1 uses or (b) uses occurring under general authorisations may be responsible.
- If uses under general authorisations are causing problems, also consider changing the conditions for defining general authorisations to make them stricter in that area (following due process).
- Also examine whether or not water users, especially those discharging waste into the water resource, are taking all reasonable steps to minimise their impacts.
- Consider the possibility of illegal water use.

If the degree of source management is considered adequate, then consider whether or not the determination of the RQOs was based on a water quality dataset that was sufficiently representative of the resource.

If the water quality dataset used for the RQOs is considered to be sufficiently representative of current times, then the appropriateness of the class itself can be questioned and revised if necessary (again following due process).

1.4.3.11 Non-compliance with licence conditions

Compliance with specific water use licence conditions may not be occurring and this may be suspected as being responsible for non-compliance with RQOs and/or RWQOs. In this case, the regulatory procedures described in the Source Management Strategy should be applied.

1.4.3.12 Remediation

Responsibility for costs lies with those who caused the impact. However, when they cannot be made responsible (*e.g.* cannot be identified), for example in so-called "legacy cases", the Department may need to assume responsibility. Given the inevitable expense of remediation, particularly when groundwater is involved, the need for remediation should be carefully prioritised to ensure cost-effectiveness, based on the following considerations:

- The most desirable time frame for achieving the designated management class.
- The current and intended use of the water resource.
- The positive and negative socio-economic impacts, and
- The precautionary approach.

1.4.4 Water quality monitoring

The objectives of monitoring for resource directed management of water quality are (DWAF, 2005d): *To measure, assess and report on a regular basis the status and trends broadly relating to water quality in water resources, and their management, in a manner that will support balanced decision-making and planning in the contexts of fitness for use and aquatic ecosystem integrity in the Catchment Management Agency's quest for sustainable development.*

The most pressing programmes will be water quality monitoring programmes that provide information that is directly and immediately useful to water resource managers. These include the following:

- Performance monitoring of RQOs or RWQOs.
- Compliance monitoring of water use licence conditions.
- Baseline monitoring for the ecological Reserve.
- National water quality status and trends monitoring.

More holistic information than just resource quality is required to properly manage (a) the resource, (b) those impacting on the resources and (c) those impacted by the resource. Monitoring that genuinely supports decision-making related to sustainable development must therefore go well beyond just water quality (DWAF, 2005d). The Pressure-State-Impact-Response (PSIR) framework can be used to provide a structure for the broader monitoring required. A phased approach will be important with priority given initially to (a) state monitoring followed by (b) pressure monitoring (or those activities impacting on water quality) and then (c) impact monitoring (of resource, societal and economic impacts of inadequate water quality) and finally (d) response monitoring (referring to the decisive responses of society) which further improves the understanding of the impacts of inadequate water quality.

1.4.5 Capacity creation and maintenance

Two specific dimensions must be addressed in order to create appropriate capacity:

- *Time dimension (short-term & long-term)*.
- *Internal-external dimension*: Capacity must be created both within the Department and Water Management Institutions (WMIs) and in external stakeholders.

The most demanding of the above two dimensions is the time dimension. There is a desperate need to facilitate better resource directed management of water quality immediately. The strategy must be to move from pragmatic, and perhaps low confidence, decision-making initially to doing things better (with greater confidence) in the longer-term. In effect, the short-term requirements should be met using management instruments that are currently available. However, the long-term strategy must be to move towards more fundamental "knowledge creation".

Knowledge can be defined as the *capacity for informed action*. It should be the ultimate aim to create a "learning environment" within the water sector and within the Department in particular. The learning principles proposed by Roux *et al.* (2006) for good ecosystem governance should form the basis of any detailed capacity creation strategy relating to the resource directed management of water quality. These are summarised as follows: "*Good ecosystem governance requires positively persistent and adaptive people with a culture of empathy for other knowledge systems and levels. Their knowledge must be transdisciplinary, moulded by a common future focus, acquired by patiently engaging their prior knowledge and learning by doing in an environment of social knowledge sharing.*"

Attention must also be given to ensuring that management is sustainable. The empowerment required to achieve this includes objective empowerment (improved opportunities), competence (basic skills) and subjective empowerment (self-confidence). All three must be addressed for a capacity creation strategy to be successful. Training must include a wide variety of conceptual outcomes relating to understanding all facets of water quality and familiarity with currently available management instruments (especially software and other guidelines that can facilitate better water quality management).

Existing training courses relating specifically to resource directed management of water quality should continue to be made available on an annual basis (or on demand based on the level of staff turnover). They should be extended and enhanced as and when necessary. Refresher courses should also be offered.

Communication mechanisms such as the use of posters, pamphlets, and newsletters should be reviewed on an annual basis to (a) create awareness among new staff members and external stakeholders (like other government departments), and (b) maintain awareness among experienced water resource managers.

1.4.6 Action plan

1.4.6.1 Resource water quality objectives

It is important that nationally consistent information be generated relating to water quality that can begin to provide a sound basis for more focused catchment assessments, catchment planning, catchment visioning exercises and ultimately catchment management strategies.

Initial efforts must focus on water resources currently experiencing water quality stress. A software facility exists that helps to determine the degree of water quality stress in watercourses (DWAF, 2005p). This inherently "low-confidence" decision support tool should be used to prioritise such surface water resources on a national basis on the basis of their degree of water quality stress.

The next phase will be to begin the process of determining management objectives that can better focus water resource management in the immediate future. Catchments should be identified in which there are (a) adequate financial and human resources, and (b) commitment to the process from relevant regional offices of the Department or CMAs. The level of confidence required to determine RWQOs should then be assessed (medium or high confidence). The appropriate procedures should then be followed to determine RWQOs at appropriate locations in the water resources (DWAF, 2005i).

Once the RWQOs have been determined, a suitable performance monitoring programme must be implemented as soon as possible. It will also be essential that the necessary source directed controls be identified and that these become firmly embodied in the catchment management strategy.

1.4.6.2 Capacity creation

An initiative should be started that will produce a detailed capacity creation plan that includes the following:

- Explicit recommendations that will move the Department towards becoming a learning organisation.
- Detailed recommendations that expand on the proposed short- and long-term strategy.
- Explicit consideration of the learning principles proposed by Roux *et al.* (2006).
- Explicit attention to objective and subjective empowerment and increasing basic competencies.
- Resources (financial and human) required for such capacity creation, and
- Detailed time plan that expands on that given in this strategy.

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