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Resource Directed Management of Water Quality

Volume 1.1

Summary Policy

August 2006

Edition 1

water & forestry

Department:
Water Affairs & Forestry
REPUBLIC OF SOUTH AFRICA

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Policy formulation by:

Insight Modelling Services CC
PO Box 38953
Garsfontein East
0060

Project Co-ordination by:

CSIR: Natural Resources and the Environment (NRE)
PO Box 395
Pretoria
0001

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AUTHORS: Kevin Murray

REVIEWERS: Peter Ashton

EDITORS: Hanlie Hattingh, Retha Stassen and Jurgo van Wyk

LEAD CONSULTANT: CSIR: Natural Resources and the Environment (NRE)

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Approved for CSIR, NRE:

_____

Ms Hanlie Hattingh
CSIR Project Leader and Manager

_____

Dr Dirk Roux
CSIR Project Co-Leader

Approved for the Department of Water Affairs and Forestry by:

_____

Mr Pieter Viljoen
Deputy Director: Water Resource Planning Systems: Water Quality Planning

_____

Mr Chris Moseki
Director: Water Resource Planning Systems

ACKNOWLEDGEMENTS

The following individuals are thanked for their contributions to the document:

Project Management Committee

Pieter Viljoen	Department of Water Affairs & Forestry (DWAF)	Project Manager
Jurgo van Wyk	Department of Water Affairs & Forestry	Assistant Project Manager
Retha Stassen	Department of Water Affairs & Forestry	Project Co-ordinator
Hanlie Hattingh	CSIR NRE	Consultant Project Leader & Manager
Dirk Roux	CSIR NRE	Consultant Project Co-Leader

Project Team

Ernita van Wyk	CSIR: NRE	Catchment Visioning
Guy Pegram	Pegram & Associates	Co-operative Governance
Kevin Murray	Insight Modelling Services	Policy Formulation
Linda Godfrey	CSIR: NRE	Sustainability Indicators, RDM
Marius Claassen	CSIR: NRE	Risk-Based Decision-Making
Martella du Preez	CSIR: NRE	Monitoring
Michelle Binedell	CSIR: NRE	Sustainable Development
Nicola King	CSIR: NRE	Socio-economics

Specialist Review

Peter Ashton	CSIR: NRE	Policy
Michelle Audouin	CSIR: NRE	Policy, Sustainable Development
Tally Palmer	Institute for Water Research	Policy
Susan Taljaard	CSIR: NRE	RDM Estuaries
Maritza Uys	Maritza Uys	Legal Aspects

Members of Project Steering Committees

Althea van der Merwe	DWAF: Mpumalanga Regional Office
Anet Muir	DWAF: Water Abstraction and Instream Use (Environment & Recreation)
Anthony Turton	Gibb-Sera Chair in IWRM (CSIR)
Ashwin Seetal	DWAF: Water Allocation
Barbara Schreiner	DWAF: Policy and Regulation Branch
Barbara Weston	DWAF: Resource Directed Measures
Bettie Conradie	DWAF: Northern Cape Regional Office
Bill Rowlston	DWAF: Policy and Strategy Coordination
Carin Bosman	DWAF: Resource Protection and Use
Chris Moseki	DWAF: Water Resource Planning Systems
Cornelius Ruiters	DWAF: Water Use
Danie Smit	Department of Environmental Affairs & Tourism
Dawie Maree	DWAF: Gauteng Regional Office
Derek Weston	DWAF: Water Management Institution Governance
Dirk Roux	CSIR: NRE
Eddie van Wyk	DWAF: Hydrological Information
Elize Swart (NC Khoza)	Department of Minerals & Energy
Ernita van Wyk	CSIR: NRE
Eustathia Bofilatos	DWAF: Water Management Institution Governance
Fanie Botha	DWAF: Water Resource Planning Systems (Integrated Hydrological Planning)
Frank Wimberley	Golder Associates: Source Directed Measures Consultant
Frans Stoffberg	DWAF: National Water Resources Planning
Gareth McConkey	DWAF: Western Cape Regional Office
Guy Pegram	Pegasus
Gys Hoon	DWAF: Free State Regional Office
Hanlie Hattingh	CSIR: NRE

Harrison Pienaar	DWAF: Resource Directed Measures
Henry Abbott	DWAF: Waste Discharge & Disposal
Herman Keuris	DWAF: Information Programmes
Hugh Dixon-Paver	DWAF: KwaZulu Natal Regional Office
Jaco Nel	DWAF: Hydrological Information
Jacob Matlala	DWAF: Limpopo Regional Office
Jean Msiza	DWAF: Stakeholder Empowerment
Jurgo van Wyk	DWAF: Water Resource Planning Systems
Kevin Murray	Insight Modelling Services
Liesl Hill	CSIR: NRE
Linda Godfrey	CSIR: NRE
Loraine Fick	DWAF: Water Abstraction and Instream Use
M Phaloane	Nunganie Development Consultant
Manda Hinsch	DWAF: Waste Discharge & Disposal
Maria Matooane	DWAF: Free State Regional Office
Marius Claassen	CSIR: NRE
Marius Keet	DWAF: Gauteng Regional Office
Marlese Nel	DWAF: Information Programmes
Martin van Veelen	BKS
Mike Warren	DWAF: Water Abstraction and Instream Use (Stream flow Reduction)
Minolen Reddy	DWAF: Mpumalanga Regional Office
Mzuvukile Tonjeni	DWAF: Eastern Cape Regional Office
Nancy Gcwensa	Department of Health
Nicky Naidoo	Nemai Consulting
Niel van Wyk	DWAF: National Water Resources Planning
Obet Baloyi	DWAF: Water Abstraction and Instream Use (Stream flow Reduction)
Peter van Niekerk	DWAF: Integrated Water Resources Planning
Petrus Venter	DWAF: North West Regional Office
Piet Pretorius	DWAF: Water Abstraction and Instream Use
Pieter Viljoen	DWAF: Water Resource Planning Systems
Priya Moodley	DWAF: Water Resource Planning Systems
Retha Stassen	DWAF Project Co-ordinator
Riana Munnik	DWAF: Gauteng Regional Office
Sakkie van der Westhuizen	DWAF: Waste Discharge & Disposal
Sebastian Jooste	DWAF: Resource Quality Services
Simon Moganetsi	DWAF: Water Abstraction and Instream Use
Solly Maluleke	Department of Land Affairs
Sonia Veltman	DWAF: Water Resource Planning Systems (Integrated Hydrological Planning)
Steve Mitchell	Water Research Commission
Suzan Oelofse	DWAF: Water Resource Planning Systems
Tinyiko Malungani	CSIR: NRE
Toni Belcher	DWAF: Western Cape Regional Office
Tlhagala R Mgogsheng	DWAF: Limpopo Regional Office
Wynand Fourie	Department of Environmental Affairs & Tourism

EXECUTIVE SUMMARY

"Making water resource management water quality friendly"

Scope

This document is a summary of a more complete supporting policy [DWAF, 2005] of the National Water Act (36:1998). It pertains specifically to management of the use and protection of the water quality component of inland water resources, including surface watercourses, groundwater, estuaries and wetlands.

Although the water quality component is addressed here explicitly, it must be managed holistically, within the general framework of "resource directed measures", with water quantity (flows) and the habitat and biota components that comprise the overall water resource quality.

This policy also addresses how this "resource directed" management of water quality should influence the management of anthropogenic activities that modify the water quality in water resources.

Vision and objectives

This policy envisions an equitable and sustainable balance between the use and protection of water quality in water resources to the benefit of all South Africans. To achieve this, the policy describes how water quality considerations should be integrated into water resource management. Detailed implementation requires the associated strategy and management instruments.

Sustainable development

The current political imperative for socio-economic development necessitates that the balance between the use of water resources and their protection gives preference to, from an overall national perspective, their sustained use for socio-economic development. However, strict protection will occur in some circumstances. The principles of sustainable development are used as a framework for understanding and managing this balance. "Equitable" is specifically taken to mean "just and fair in the sense of being based on laws and accepted principles".

Resource directed measures

Resource directed measures (the management class, Reserve and resource quality objectives) are seen as the primary framework for facilitating sustainable development and implementing this policy. The management class in particular must capture the most desirable balance between use and protection and be based on an appropriate degree of stakeholder engagement.

Adaptive management

The Department subscribes to a cyclical adaptive management approach often categorised as "plan, implement, check and review". The pragmatic though prudent use of lower confidence management instruments in the present interim transitional phase is also encouraged. However, this must be in the interests of facilitating appropriate socio-economic development.

Allocatable water quality

The Department recognises that water quality can be "used". The "allocatable water quality" will typically be quantified in terms of individual water quality attributes (*e.g.* as concentrations or loads). If there is no allocatable water quality, the water resource will be regarded as "stressed" in respect of that attribute.

The Department will facilitate equitable access to water quality in accordance with current national imperatives and the principles of sustainable development. Accordingly, the Department will give particular emphasis to redress and recognise the principle of acceptable prejudice when determining an equitable allocation. This will apply particularly when re-allocation of water, or water quality, requires curtailing existing lawful use (through, for example, compulsory licensing). Gender equity, and especially rural gender equity, will also receive priority.

Source directed controls

The control and management of sources of pollution must be guided by the National Environmental Management Act (108:1998) as well as the management classes set for potentially affected water resources.

The precautionary approach is always applicable and will be balanced against socio-economic necessities. Preventing pollution in the first place will always be encouraged while pursuing the best practicable environmental option. Should some water quality degradation be inevitable, waste minimisation will be encouraged. The precautionary approach will be applied to point sources of pollution by enforcing uniform national minimum requirements or standards. The degree to which they may be enforced or relaxed will depend on the degree of water quality stress.

Monitoring

Sound water quality monitoring is essential for adaptive management. This should include monitoring of (a) overall national water quality status and trends, (b) compliance with resource quality objectives, (c) compliance with water use licence conditions, including monitoring of the affected water resource, and (d) remediation efforts.

Useful monitoring variables include stressors (*e.g.* physico-chemical, radiological, microbial) and responses (*e.g.* eutrophication, invertebrates & fish, toxicity).

The expensive nature of monitoring necessitates monitoring designs and implementation strategies that (a) maximise demonstrably useful information while minimising costs, and (b) support well-defined objectives and informed decision-making.

Monitoring objectives, design and implementation must be reviewed at regular intervals not exceeding five years.

Review

All monitoring should inform the periodic review of policy objectives, the policy itself and the associated implementation strategy and instruments. The degree to which individual catchment visions are being realised through catchment management strategies and the degree to which these are influencing achievement of national goals should also be reviewed.

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ACRONYMS

DWAF	Department of Water Affairs and Forestry
NEMA	National Environmental Management Act
NWA (36:1998)	National Water Act
RDM	Resource Directed Measure
RWQOs	Resource Water Quality Objective

SECTION 1: SUMMARY POLICY ON THE RDMWQ

PHOTO: K MURRAY

1.1 Introduction

1.1.1 Need for policy

The National Water Act (NWA (36:1998)) is an enabling Act that provides for drafting of supporting policies, strategies and legislation. This policy is one such supporting policy relating specifically to the resource directed management of water quality. The following issues create a specific need for clear policy:

- Balancing the degree to which water, and water quality, is used (*e.g.* for socio-economic development) with the degree of protection of water resources as natural systems (for current and future generations) requires both political and scientific considerations.
- The nature of the imbalance between the demand and supply of water, and water quality, is such that equitable allocation of these resources is not possible without management intervention.
- Resource directed management of water quality requires certain specialist skills and decision-making is often complex and based on uncertain or incomplete data and information.
- Consistent nationwide application of legislation relating to management of water quality is essential.

1.1.2 Scope

This policy specifically focuses on measures to manage both the use and protection of the water quality component of inland water resources, including surface watercourses, groundwater, estuaries and wetlands. The specialised nature of water quality warrants addressing this component explicitly. However, the policy recognises that although water quality is the primary focus, it cannot, and should not, be managed in isolation. It is inextricably linked with water quantity (typically water flow) and the integrity of aquatic ecosystems, all collectively referred to in the NWA (36:1998) as the "resource quality".

This policy considers the management of water quality from the perspective of the water resource (making it "resource directed"). However, this perspective also influences the management of anthropogenic activities that modify the water quality in water resources, the so-called "source directed controls". The policy does not address source directed controls that do not relate directly to the water resource.

1.1.3 Broader alignment

This policy is about participatory management of the water quality component of water resources within the more general frameworks of integrated water quality management, integrated water resource management and, ultimately, integrated environmental management.

This policy also regards the overall strategies of continual improvement and adaptive management as essential frameworks for policy implementation. Specifically the "plan, implement, check and review" cycle provides a useful categorisation for activities relating to resource directed management of water quality (van Wyk *et al.*, 2002).

All aspects of this policy are aligned with, and give substance to, the principles described in the National Water Policy White Paper (DWAF, 1997a). The policy also supports the National Water Resource Strategy (DWAF, 2004), specifically providing more detail relating to the management of water quality.

1.2 Vision and Objectives

1.2.1 Integrating water quality

The vision of this policy is to ensure that the water quality in South African water resources enables an equitable and sustainable balance to be achieved between its use by society and its protection as a critical component of a natural system so that the quality of life of all South Africans is improved and sustained in the long term.

The specific management objective of this policy is to provide effective guidance on how water quality considerations should be integrated into water resource management in general, hence the slogan "making water resource management water quality friendly".

1.2.2 Implementation strategy and instruments

The policy is regarded as providing 'guidance' (implying generality) not 'guidelines' (implying specificity). It will be supplemented with a detailed implementation strategy and management instruments, all of which are necessary to give specificity to the policy. The instruments comprise practical guidelines and procedures for specific applications that make resource directed management of water quality more accessible to the target audience.

1.2.3 Target audience

The Department of Water Affairs and Forestry ("the Department") has primary responsibility for the implementation of this policy.

This policy is therefore intended to provide guidance to those responsible for either recommendations or decision-making relating to the above vision and management objective within:

- The Department, both at head office and in Regional Offices;
- Water Management Institutions, especially catchment management agencies;
- Other government departments with related functions;
- Specialist consultant organisations, and
- Other interested or affected organisations.

1.3 Underlying Philosophy

1.3.1 Sustainable development

The ethic of sustainable development is at the core of this policy. It specifically endeavours to ensure that future generations can meet their own needs while promoting socio-economic development and improved quality of life for all in the current generation. This should be done in a manner that uses water resources in general, and water quality in particular, within the ability of the ecosystems to satisfy such needs now and in the future.

1.3.2 Enabling principles

This policy explicitly addresses the balance that should be achieved between the following principles that enable sustainable development:

- *Protection of water resources*: This focuses specific efforts on maintaining and improving the integrity of water resources and of their water quality in particular, and thus regaining or sustaining their capacity to provide goods and services.
- *Optimal water use*: This extends the principle of beneficial use of the NWA (36:1998) to strive to promote socio-economic development and hence improved quality of life resulting from the use of water, and water quality in particular, in a manner that leads to the best alternative use in the public interest.
- *Equity between generations*: This promotes socio-economic enhancement that does not compromise the basic rights of future generations to (a) sufficient water of adequate quality, and (b) healthy ecosystems.
- *Current equitable access*: This strives to fairly and justly balance the priority needs of the nation with other socio-economic developmental needs of the current generation by basing decisions relating to access to these water resource goods and services on the following priority order: (a) the Reserve, (b) honouring international obligations, (c) national strategic uses, (d) strategic future growth in special circumstances, and (e) inter-basin water transfers, and then other uses.
- *Environmental integration*: This strives to holistically consider all important interactions with, and within, ecosystems and water quality in particular.
- *Good governance*. This strives to ensure that all stakeholders (a) manage their affairs with integrity and in a lawful manner, and (b) apply accepted principles and procedures.

Although acknowledging the inevitable difficulties, the Department will strive for an equitable balance between use and protection of water resources that is just (*i.e.* based on legislation) and fair (*i.e.* based on accepted principles).

1.3.3 Balancing the principles

The current political imperative for socio-economic development necessitates that the balance between the use of water resources and their protection gives preference to, from an overall national perspective, their use for socio-economic development, especially for poverty eradication and redress of past inequities. However, under no circumstances should water resources be exploited to the extent that they are "unacceptably degraded" and unable to provide adequate water quality on a sustainable basis.

It is acknowledged that the quality of life of all South Africans is inextricably linked, directly and indirectly, with maintaining the integrity of aquatic ecosystems since these provide many of the goods and services upon which society depends (particularly good quality water). Accordingly, strict protection of selected aquatic ecosystems will occur when this is considered necessary to sustain the biodiversity and general integrity of those ecosystems.

This philosophy will be implemented primarily through "resource directed measures". These measures relate to the management class, the Reserve and associated resource quality objectives. These will comprise some of the most important instruments that will ultimately enable improvement of quality of life through effective water resource management.

1.3.4 Interim transitional phase

The Department acknowledges the comprehensive nature of resource directed measures as mandated by the NWA (36:1998) and that achievement of full-scale implementation will be gradual and time-consuming. The current need for socio-economic development is also acknowledged. Accordingly, this policy is deliberately pragmatic about the interim transitional phase.

1.3.5 Adaptive management

The Department acknowledges that:

- There is a national service delivery imperative, and
- Management of water resources is complex and multi-disciplinary, and
- Water resources are (a) in a state of continuous change and (b) are subject to unpredictable changes, and
- Decisions need to be made in situations where there is frequently insufficient or uncertain data and information.

Consequently, the Department subscribes to adaptive management which strives for continual management improvement in a dynamic yet systematic manner by balancing robustness with a flexibility that allows for change when circumstances demand this.

In the spirit of such adaptive management, the Department will use pragmatic instruments and guidelines (typically associated with low confidence) as the basis for decision-making in the interim transitional phase. The objective is to avoid unnecessary delays in decision-making, particularly when in the interests of facilitating appropriate socio-economic development. These instruments will be progressively replaced by more accurate (and higher confidence) instruments when the demand arises. When using approximate methods of calculation as a basis for decision-making, the Department will openly acknowledge the known underlying assumptions and use independent sources of information or methods ("multiple lines of evidence) whenever this is feasible and cost-effective.

1.3.6 Allocatable water quality and stress

The Department recognises that, just as a quantity of water can be "used", so can water quality. For water to be regarded as "fit for use" for a number of different users in the same catchment, the water quality needs to satisfy the most demanding of those users. Typically this will be quantified in terms of individual water quality attributes. This is the basis for the concept of "allocatable water quality" which can be defined from two points of view.

First, it can be regarded as that water quality, if any, that remains allocatable (available) to uses other than the strategic national priority uses listed above (the Reserve, etc, see Section 1.3.2) and current lawful uses (all contributing to current equitable access) (see Figure 1). It can also be more formally regarded as the maximum worsening change in any water quality attribute away from its present value that maintains it within a pre-determined range reflecting the desired future state (typically defined by a resource quality objective).

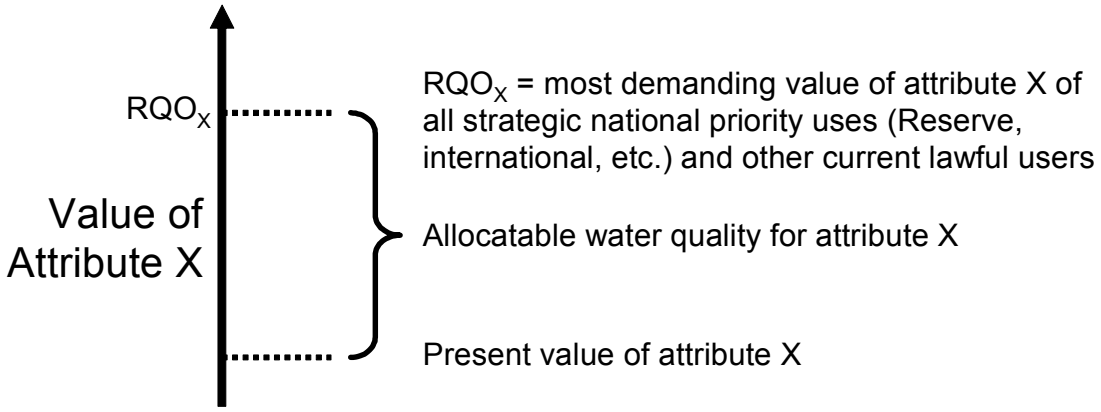

Figure 1.1: Simple conceptual illustration of allocatable water quality for an unstressed attribute.

It is also the Department's policy to continue to facilitate current equitable access to this remaining allocatable water quality in accordance with current national imperatives and the principles of sustainable development.

A water resource will be considered "stressed" in respect of a water quality attribute if, for that attribute, there is no allocatable water quality.

1.4 Strategic National Perspective

One objective of the Department is to improve the quality of life of all South Africans. On a broad national perspective, the Department recognises the interconnectedness of resource directed management of water quality, water resource management in general and the following particular challenges facing South African society:

- Climate change,
- HIV/AIDS,
- Poverty, and
- Past inequities.

Many other national imperatives are addressed in the policy either directly or indirectly (either through policy statements or policy principles). However, these four specific issues either affect water quality in water resources directly or can be addressed by effective management of such water quality.

The significant effects of climate change on evaporation rates, runoff, flow regimes, etc. will impact on the quality of water in South Africa's water resources. Impacts are also likely to be different in the various water management areas. Planning will take account of credible predictions relating to water quality to ensure that attainment of desired future states for water resources (reflected in their resource management classes) is feasible.

Besides the immeasurable human suffering caused by the HIV/AIDS pandemic, the Department also recognises that to perform its duties, it must take specific account of the many socio-economic effects of HIV/AIDS. These include demographic changes, increased inability to pay for services, increased risks to waterborne diseases in people with compromised immune systems and decreased productivity (Ashton and Ramasar, 2002). The Department recognises the need to work closely with the Department of Health in dealing with these issues in a spirit of co-operative governance.

The Department also recognises that poverty diminishes human dignity. Water is one of the most basic enabling elements of survival. The Department will therefore ensure sound application of the Reserve to address both basic human needs and the integrity of the ecosystems and aquifers that supply our water. The Department also recognises that water, and water quality in particular, is a critical enabling element for socio-economic enhancement. It will therefore give particular emphasis to water uses that demonstrably result in poverty eradication.

The Department recognises the enormously negative impacts that past discriminatory policies have had on all South Africans. It therefore commits itself to addressing these in an equitable manner that ensures sustainable development and use of our water resources. Although equality is a principle enshrined in the Constitution, redress will always be considered with due diligence. In particular, until general government policy dictates otherwise, redress may carry a greater relative weight than equality in those catchments in which previous water allocations made prior to the current NWA (36:1998) were discriminatory. The Department also commits itself to applying gender equity, with special emphasis on rural gender equity.

1.5 Catchment Management

1.5.1 Catchment assessment

Catchment assessment is the process of collating, processing and interpreting data and information about water-related conditions, issues and developments in a catchment for the ultimate purpose of providing a sound technical basis for catchment management strategies (DWAF, 2003). The catchment assessment should provide a statement on the present state of water quality, the degree of compliance with the vision and corrective actions that are needed to improve or maintain water quality.

The catchment assessment should be appropriately flexible in its scope, be pragmatically consistent with the degree of water quality stress and be carried out at an appropriate spatial scale. It must also address all necessary water quality issues, including those that relate to the Reserve and to current and future water uses and requirements.

1.5.2 Catchment visioning

Catchment visioning is the iterative process of evolving, over time, a more relevant and more detailed:

- Collective statement from all stakeholders of future aspirations regarding the relationship between the stakeholders, in particular their quality of life in its broadest sense, and the water resources in a catchment, and
- Strategy to move towards that vision, being either the catchment management strategy itself or one that directly supports it.

The Department regards catchment visioning as an important planning instrument for integrated water quality management. It is also an essential participatory management process for ensuring that use of the country's water resources is "in the public interest" (a specific mandate of the NWA (36:1998)). The Department will ensure that stakeholders have an understanding of the necessary concepts relating to resource directed management of water quality to enable their meaningful involvement.

The catchment vision should be progressively realised over time by applying adaptive management and prudent pragmatism within the catchment management strategy.

The products of the catchment visioning exercise should inform, and be quantified by, classification of the resources and the setting of the associated resource quality objectives.

In the interim transitional phase, and under special circumstances, the Department will permit catchment visioning at lower levels of confidence (referring to the level of confidence that can be placed in the appropriateness of the vision). The dangers of doing this will be explicitly acknowledged and carefully weighed against the advantages. For example, in catchments that are not water quality stressed (in respect of any variable of concern) the Department may permit catchment visioning with minimal levels of stakeholder engagement and less than ideal catchment assessment data in the interests of (a) cost-effectively initiating the longer-term progressive development and attainment of a vision, and (b) preparing for a process that is more inclusive.

Furthermore, in the interim transitional phase, while recognising that water quality problems are more acute in some areas than in others, and that cost-effective use of human and financial resources is essential, the catchment management strategy will focus initial implementation on those management units in which the need is most urgent.

1.5.3 Catchment management strategy

Acknowledging the strategic nature of water management areas, the Department will ensure that catchment management agencies progressively establish and implement catchment management strategies. These will give effect to the National Water Resource Strategy (DWAF, 2004) and give attention to water quality-related issues as described in this policy.

1.6 Resource Directed Measures

1.6.1 Confidence

The Department recognises the fundamental importance of (a) resource directed measure as a strategy contributing to sustainable development, and (b) establishing these resource directed measures with adequate confidence.

The Department recognises that there are many factors determining the required level of confidence. These include the immediate application of the outcome of the resource directed measure process, the degree of water quality stress and the severity of impacts of water uses on water quality - both at the present time and in the future.

The Department will be permitted to establish resource directed measures at different levels of confidence, particularly during the interim transitional phase, with appropriate levels of caution. For example, if:

- A sense of urgency exists, or
- A culture of involvement in stakeholder engagement processes in the catchment is either lacking or is such that considerable preparatory groundwork is necessary,

These may be considered as reasons for adopting an initial approach of lower confidence. However, under all circumstances of resource directed measures being established at levels of confidence that are compromised for any of the above reasons, it is the Department's policy to explicitly acknowledge, and manage accordingly, the likely higher associated risks.

1.6.2 Resource management class

The resource management class must capture the most desirable long-term balance between protection of water resources, optimal water use, equity between generations and current equitable access (including honouring international obligations). This balance will be achieved for individual water resources through a resource classification system that applies the principle of environmental integration and takes cognisance of the catchment vision. However, an overall appropriate national balance of (a) strict protection of some resources on the one hand, with (b) use (and possible degradation) of other resources on the other, will be necessary.

Special consideration will be given to resources that are vulnerable, sensitive or scarce and in an unimpacted or near-unimpacted state. Groundwater will be regarded as vulnerable by default unless it can be shown otherwise.

The sustained achievement of the resource management class is regarded as an essential requirement for (a) progressive achievement of the catchment vision, and (b) facilitating sustainable development.

Once a management class has been established, the Department may in future consider a more protective or more lenient management class to either enable stricter control or promote much-needed socio-economic development. This may be driven, for example, by a fundamental inability to implement the catchment management strategy and hence achieve the catchment vision. However, this will typically require considerable justification, possibly a re-consideration of the vision and careful attention to due process.

1.6.3 Resource quality objectives and Reserve

The Department recognises that, in setting resource quality objectives for a chosen management unit of a water resource, a technical process of integration of water quality, water quantity and ecosystem integrity, is necessary, the results of which will further inform the stakeholder engagement process. These objectives can include a wide variety of characteristics of the resource, some of which can refer explicitly to water quality. Until the classification system has been prescribed, provision is made by the NWA (36:1998) for determination of a preliminary class, a preliminary Reserve and preliminary resource quality objectives. These preliminary measures can be determined at different levels of confidence.

Once resource quality objectives have been published in the *Gazette*, or preliminary resource quality objectives determined, they must be given effect. To do so, the Department or water management institutions (such as catchment management agencies) may also set narrative or quantitative "resource water quality objectives" (either in-stream or in-aquifer). These may be set at a greater spatial resolution (*i.e.* closer together) and/or temporal resolution (*i.e.* more frequently monitored) than the resource quality objectives (preliminary or otherwise) to which they may be linked. The purpose of these will be to provide greater detail upon which to base management of water quality aimed at achieving and sustaining compliance with resource quality objectives.

In the interim transitional phase, the Department will use low confidence standard approaches and instruments to determine a preliminary classification of water resources nationwide based on water quality. This will be used to identify potential priority water resources exhibiting water quality stress. Preliminary resource quality objectives relating to water quality and resource water quality objectives will then be set for these priority resources using more accurate (higher confidence) approaches. This will provide initial impetus to the implementation of resource directed management of water quality in accordance with the intentions of the NWA (36:1998).

The Department recognises that some impacts on water quality, particularly those relating to conservative water quality variables, can have increasingly cumulative effects towards the most downstream reaches of surface water resources. Accordingly, the setting of resource quality objectives or resource water quality objectives for a particular catchment must take cognisance of that catchment's water quality issues (current and future) and those of upstream, and particularly downstream catchments as well as those linked through inter-basin transfers. All water quality-related objectives in such catchments must be mutually compatible.

1.7 Source Directed Controls

1.7.1 Resource perspective

Recognising that the exact nature of source directed controls depends on the management objectives that are set for local water resources, it is within the scope of this policy to give guidance on source directed controls from this perspective. However, it is also noted that the nature of source directed controls is significantly determined by the National Environmental Management Act (NEMA (107:1998)).

1.7.2 Precautionary approach

The precautionary approach entails ensuring that conservative decisions or actions are implemented, which minimise the risk of unpredictable ecological impacts that may threaten sustainability when there is uncertainty regarding the likelihood of such impacts.

The Department will balance the ecological necessity of this approach with the water quality requirements, and associated socio-economic necessities, of current and proposed water uses. This will be particularly important in the interim transitional phase and in the absence of resource quality objectives for the potentially impacted water resource. The precautionary approach applies at many levels, including pollution prevention, waste minimisation and the differentiated approach.

1.7.3 Pollution prevention

Irrespective of the amount of allocatable water quality, the Department will strongly encourage water users to prevent pollution whenever possible (*e.g.* by striving for a "zero effluent" state for water users producing effluents) by pursuing the best practicable environmental option. This is the option that provides the most benefit or causes the least damage to the environment as a whole, at a cost acceptable to society, in the long-term as well as in the short-term (NEMA (107:1998)).

Pollution prevention is aimed specifically at controlling the handling and discharge or disposal of hazardous substances. Toxicity, persistence and capacity for bioaccumulation or endocrine disruption present major threats to the receiving water environment. Where these are involved, the differentiated approach below does not apply because of the difficulties associated with determining appropriate resource water quality objectives for these pollutants.

1.7.4 Waste minimisation

The Department acknowledges that some degradation of water quality in water resources is inevitable, and is sometimes necessary, for socio-economic development. Irrespective of the amount of allocatable water quality, cost-effective waste minimisation and water conservation will be encouraged at all times. For point sources such as waste discharges, the precautionary approach will also be applied by enforcing uniform national minimum requirements or standards by default, should they exist.

When non-point pollution sources are persistently responsible for unacceptable water quality degradation, the Department will approach the responsible authority, examine the causes of the problem, and identify appropriate interventions to address the problem.

1.7.5 Differentiated approach

In catchments with no water quality stress, even if considerable allocatable water quality exists, the Department will apply the precautionary approach by enforcing, particularly in respect of point waste discharges, uniform national minimum requirements or standards by default, should they exist. However, these may be relaxed in special and equitable circumstances although the management class will have to be maintained.

In catchments with water quality stress, it is policy to (a) consider stricter requirements, and/or (b) strictly regulate or prohibit unsustainable practices in order to comply with resource quality objectives and achieve the management class.

To protect water resources at a cost acceptable to society, the Department will generally be guided by the level of protection afforded by the resource management class (informed by catchment visioning) and associated resource quality objectives. This will apply to both point and non-point sources of pollution.

In the absence of resource quality objectives (preliminary or otherwise), the Department will enforce uniform national minimum requirements or standards, should they exist, in respect of point waste discharges. If the potentially impacted resource is vulnerable or sensitive to water quality degradation, the Department may act as though the water resource is water quality stressed, applying the precautionary approach as just described.

1.7.6 Remediation

Remediation (also referred to as rehabilitation) is regarded here as direct intervention in (a) degraded land, to minimise contamination risk to a water resource, or (b) a degraded water resource, to maintain or improve water quality in the water resource.

In order to promote both optimal water use and protection of water resources, the Department will:

- Facilitate remediation of water resources, and sources of pollution (*e.g.* degraded land), especially in catchments with existing water quality stress, where this is considered necessary, practical and equitable, and
- Apply the polluter pays principle.

The Department recognises that remediation can be extremely expensive and sometimes impractical, for example in the case of some aquifers. The Department regards this as strong motivation for avoiding the need for remediation in the first place, by applying pollution prevention, waste minimisation and the differentiated approach with the emphasis stated above.

1.7.7 Water allocation

Whether referring to water quantity or water quality, the Department recognises the fundamental role that current equitable access (*i.e.* in the present generation) will play in poverty eradication. Accordingly, in its quest to appropriately balance the enabling principles of sustainable development, the Department will give particular emphasis to redress and recognise the principle of acceptable prejudice when determining an equitable allocation. This will apply particularly when re-allocation of water, or water quality, requires curtailing existing lawful use (through, for example, compulsory licensing).

Effective stakeholder engagement will be strongly encouraged and supported to ensure that all water allocation is in the public interest. In this process, socio-economic enhancement, and in particular the enabling principle designed to empower stakeholders to participate in decision-making processes, will be emphasised. Water conservation and gender equity will also receive high priority.

If the resource contains some allocatable water quality, an applicant will typically not be allocated all that is available. An appropriate fraction will be allocated that takes account of all the considerations in Section 27 of the NWA (36:1998), as well as:

- The approximate nature of, or confidence in, the determination of the allocatable water quality, and
- Unforeseen circumstances.

Because optimal water use issues in the context of water allocation go beyond the mandate of the Department, the Department will apply good governance and especially co-operative governance across the spectrum of stakeholder organisations.

1.7.8 Water use

The Department will strive to attain and maintain the designated resource management class of each water resource by, at least:

- Limiting water quality allocations to the available allocatable water quality, *i.e.* complying with resource quality objectives relating to water quality, and
- Adhering appropriately to uniform minimum requirements or standards, and
- Not permitting continual deterioration of water quality that will result in an unacceptable trend that may potentially decrease its present management class.

Within the constraints of the allocatable water quality of the resource and the catchment management strategy, and until general government policy dictates otherwise, the Department's policy is to respond positively to water uses involving allocations that, specifically in respect of persons that were subject to past discriminatory practices:

- Actively redress previous discrimination, or
- Empower and uplift such persons by provision of a quality of water that demonstrably improves their quality of life.

1.8 Monitoring

Acknowledging the Department's mandate in terms of Chapter 14 of the NWA (36:1998) to create national monitoring systems for water resources, the Department will ensure that monitoring of water quality:

- Contributes meaningfully to the Department's efforts to facilitate sustainable development,
- Is explicitly linked to resource directed measures,
- Reflects the ecologically interdependent nature of water resources, including the dependence on water quantity, whenever appropriate, and
- Becomes an essential enabling component of effective integrated water quality management of South African water resources.

1.8.1 Monitoring variables

To achieve the above objectives, the Department recognises the following as providing useful data and information on water quality:

Stressor monitoring:

- Physico-chemical monitoring (typically inorganic variables but also organic and inorganic toxicants),
- Radiological monitoring,
- Microbial monitoring (*e.g.* faecal microorganisms).

Response monitoring:

- Eutrophication monitoring,
- Biomonitoring (*e.g.* invertebrates and fish),
- Toxicity monitoring.

Furthermore, the Department recognises the importance of monitoring to some degree:

- The pressures on water quality (*e.g.* the nature of the water uses that impact on water quality),
- The social and economic impacts of water quality, and
- Decisive responses of society and government to these impacts, and
- Management performance.

In the interim transitional phase, monitoring efforts will focus primarily on stressor and response monitoring that reflects the status and trends of water quality in water resources. The monitoring of pressures, impacts and societal responses is a longer-term objective. But because such information can be very useful, it will be included in the transitional phase when necessary, simple and cost-effective.

1.8.2 Management principles

The Department acknowledges the expensive nature of both the initial design and ultimate implementation of any water quality monitoring programme and therefore commits itself to the principles of sound financial management, adaptive management and co-operative governance to ensure the monitoring remains focussed, cost-effective and sustainable. It will be ensured that:

- Each monitoring programme has well-defined objectives,
- Each monitoring design provides the maximum amount of demonstrably useful information at minimum cost,
- Data assessments and reports support informed decision-making, in particular related to (a) water quality guidelines that may be used, and (b) uncertainties associated with observations,
- No duplication of effort occurs at any stage of implementation, and
- Partnerships will be created with appropriate stakeholders who will share costs and benefits.

1.8.3 Monitoring review

In the spirit of adaptive management, the Department will review, at regular intervals:

- The relevance of each programme's monitoring objectives, and
- The effectiveness with which they have been achieved.

On this basis the programme's objectives, design or implementation strategy will be updated if necessary. Review intervals can be programme-specific but will not exceed five years.

1.8.4 National status and trends

The Department will establish national status and trends monitoring programmes that measure, assess and report on the current status and appropriate temporal trends of selected groups of water quality indicators in South African water resources. This will be done in a soundly scientific manner that will support strategic management decisions in the context of sustainable fitness for use of those water resources and the integrity of aquatic ecosystems.

The Department recognises the following strategic responsibilities that specifically motivate the need for monitoring programmes with a broad national perspective:

- Monitoring the overall national effectiveness of water quality management policies and strategies,
- Honouring international obligations and participation in appropriate global initiatives,
- Keeping abreast of international trends in emerging problems, and
- In the current interim transitional phase, the creation of monitoring capacity upon which further region-specific capacity creation can be based, for example as catchment management agencies become operational.

1.8.5 Performance

Acknowledging the importance of ensuring that water uses are such that resource management classes are attained and maintained, the Department will establish performance monitoring programmes that measure, assess and report on the degree of compliance with resource quality objectives.

Recognising the legal status of resource quality objectives, the Department will ensure that the overall process of resource quality objective compliance monitoring is scientific, and all individual procedures are adequately defensible by being applied consistently and objectively.

The degree to which compliance with resource quality objectives, or movement towards such compliance, is being achieved will intimately feed back into and drive the catchment management strategy.

1.8.6 Compliance

Although compliance monitoring relating directly to 'end-of-pipe' monitoring is largely outside the scope of this policy, the Department acknowledges the importance of such source directed controls. However, the Department will ensure that water quality monitoring in affected resources is included in water use authorisations when appropriate. These will be closely aligned with resource quality objectives relating to water quality and source management objectives.

Such monitoring provides an important information base for subsequent well-focussed corrective actions in cases where non-compliance is evident.

1.8.7 Remediation

The Department will measure, assess and report on the effects of local water quality remediation efforts in order to provide data and information on the effectiveness of those efforts. The Department will approach such monitoring in three possible ways, in order of decreasing priority:

- Incorporation into resource quality objective performance monitoring programmes.
- Incorporation into national status and trends monitoring programmes, if appropriate to a national perspective and consistent with the designs of those programmes.
- Design and implementation of temporary site-specific monitoring programmes tailored solely to provide data and information on the effectiveness of the remediation efforts.

1.8.8 Management performance

The Department will apply good governance and place special emphasis on the enabling principles of accountability and transparency. Accordingly, the Department will implement appropriate in-house monitoring of management performance. This is to ensure that deficiencies in management actions within the Department are identified and corrected as soon as possible.

The Department will also ensure that staff members are provided with adequate training and general institutional support to ensure that appropriate capacity is created to allow water resource managers to confidently take full responsibility for their actions.

1.9 Review

The Department will periodically review the current relevance of the following:

- The original objectives of this policy, and
- The policy itself, and
- The appropriateness of the strategy and associated management instruments to implement the policy and achieve its objectives.

Any indication that creates cause for concern that any of the above is no longer relevant, should result in either (a) an appropriate change to the policy or strategy through effective stakeholder engagement, and/or (b) an improvement in confidence associated with management instruments.

The Department will also periodically examine:

- The degree to which individual catchment visions have been realised through implementation of their catchment management strategies, and
- The degree to which implementation of all catchment management strategies has influenced the achievement of national goals.

Changes to catchment visions, or associated catchment management strategies, through effective stakeholder engagement, are encouraged to ensure that these remain relevant and focussed.

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