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Resource Directed Management of Water Quality

Volume 1.2

Policy

August 2006

Edition 1

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DEPARTMENT OF WATER AFFAIRS AND FORESTRY

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*These reports are internal project management documents that are not available for publication.
** These reports are earlier versions that have been improved upon in the second edition and thus are not available for publication.
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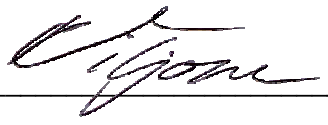

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EXECUTIVE SUMMARY

"Making water resource management water quality friendly"

Scope

This policy is a supporting policy 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.

HOW TO USE THIS DOCUMENT

If you want to …	Then …
Read a summary of the policy	Read **Section 1: Summary Policy**
Know what the policy aims to achieve	Read **Section 2.4: Vision and objectives**
Know what detailed procedures and software tools are available to implement the policy	Read **Section 2.7: Policy implementation**
See what the policy is on water use versus resource protection	Read **Section 1.3.3: Balancing the principles**
Find a definition	*For a principle*: Find the principle in the **Index (Section 8)** and go to the page number indicated in bold *For other terms*: Check the **Glossary (Section 6)**
Understand how water quality can be used and quantified	Read **Section 3.3: Resource directed management of water quality**
Understand how resource directed measures relate to this policy	*For a summary*: Read **Section 1.6: Resource Directed Measures** *For more detail*: Read **Section 4.8: Resource Directed Measures**
Understand how objectives for a water resource should influence how you deal with polluters and water users	*For a summary*: Read **Section 1.7: Source directed control** *For more detail*: Read **Section 4.9: Source directed control**
See a definition of adaptive management	Read **Section 5.5.1: Adaptive management**
See how to apply adaptive management	Read **Section 1.3.5: Adaptive management**, **Section 1.5.3: Catchment management strategy** and **Section 1.8.3: Monitoring review**
Understand what sustainable development means	First read **Section 3.2: Water resource management** Then read **Section 5.3: Sustainable development** (for the enabling principles).
Understand how sustainable development should be facilitated	*For a summary*: Read **Section 1.6: Resource Directed Measures** *For more detail*: Read **Section 4.8: Resource Directed Measures**
See what, and how, water quality monitoring should be done	*For a summary*: Read **Section 1.8: Monitoring** *For more detail*: Read **Section 4.10: Monitoring**
See what should be periodically reviewed	*For a summary*: Read **Section 1.9: Review** *For more detail*: Read **Section 4.11: Review**

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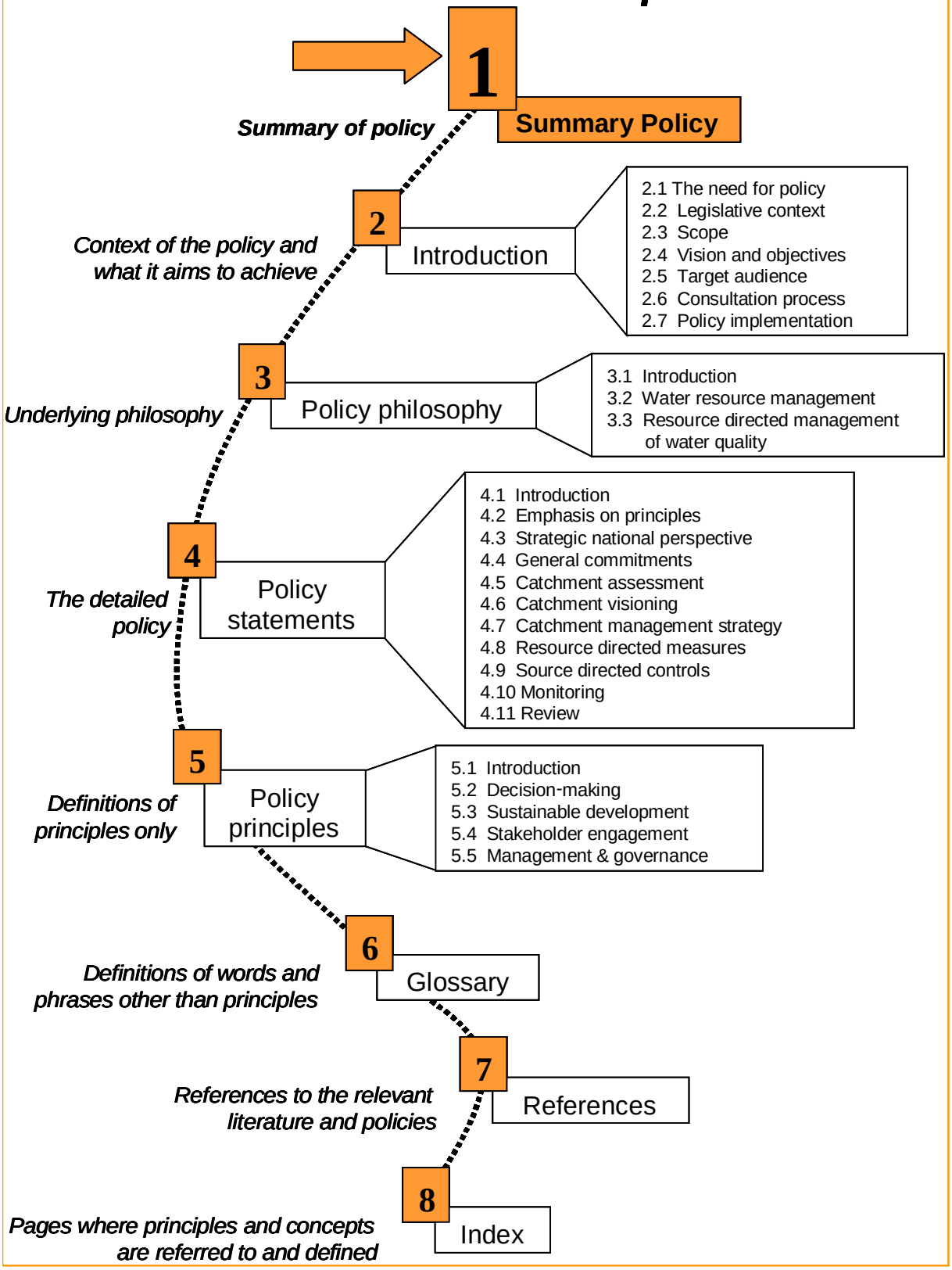
ACRONYMS

CMA	Catchment Management Agency
DWAF	Department of Water Affairs and Forestry
NWA (36:1998)	National Water Act
NEMA (107:1998)	National Environmental Management Act
PSIR	Pressure-State-Impact-Response
RDM	Resource Directed Measure
RQOs	Resource Quality Objectives
RWQOs	Resource Water Quality Objectives

Document roadmap



SECTION 1: SUMMARY POLICY ON 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. This section is a summary of the complete policy that appears in subsequent sections of this document. 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 and 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.*, 2003).

All aspects of this policy are aligned with, and give substance to, the principles described in the National Water Policy White Paper (DWAF, 1997). The policy also supports the National Water Resource Strategy (DWAF, 2004a), 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 is 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.

Accordingly, the Department subscribes to a system of adaptive management that 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.) and current lawful uses (all contributing to current equitable access) (see Figure 1.1). 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).

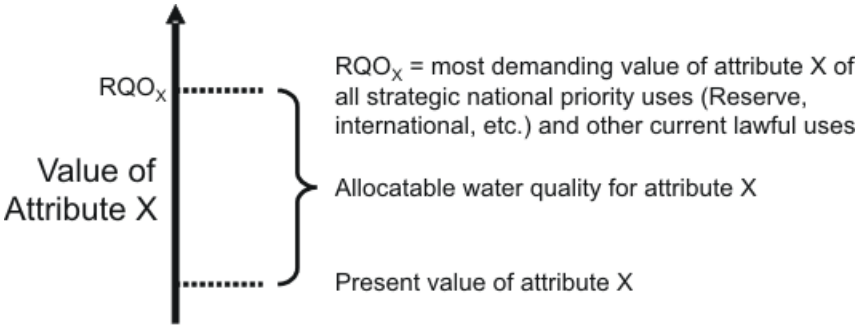


Figure 1.1: Simple conceptual illustration of allocatable water quality for an unstressed attribute

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 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 strategiess (DWAF 2003c). 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 relating to the Reserve and 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 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, 2004a) 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 measures 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.

It 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 that is acceptable to society, the Department will first be guided first 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 those 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 is 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 these objectives 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 and accountability for their actions.

1.9 Review

The Department will periodically review the 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.

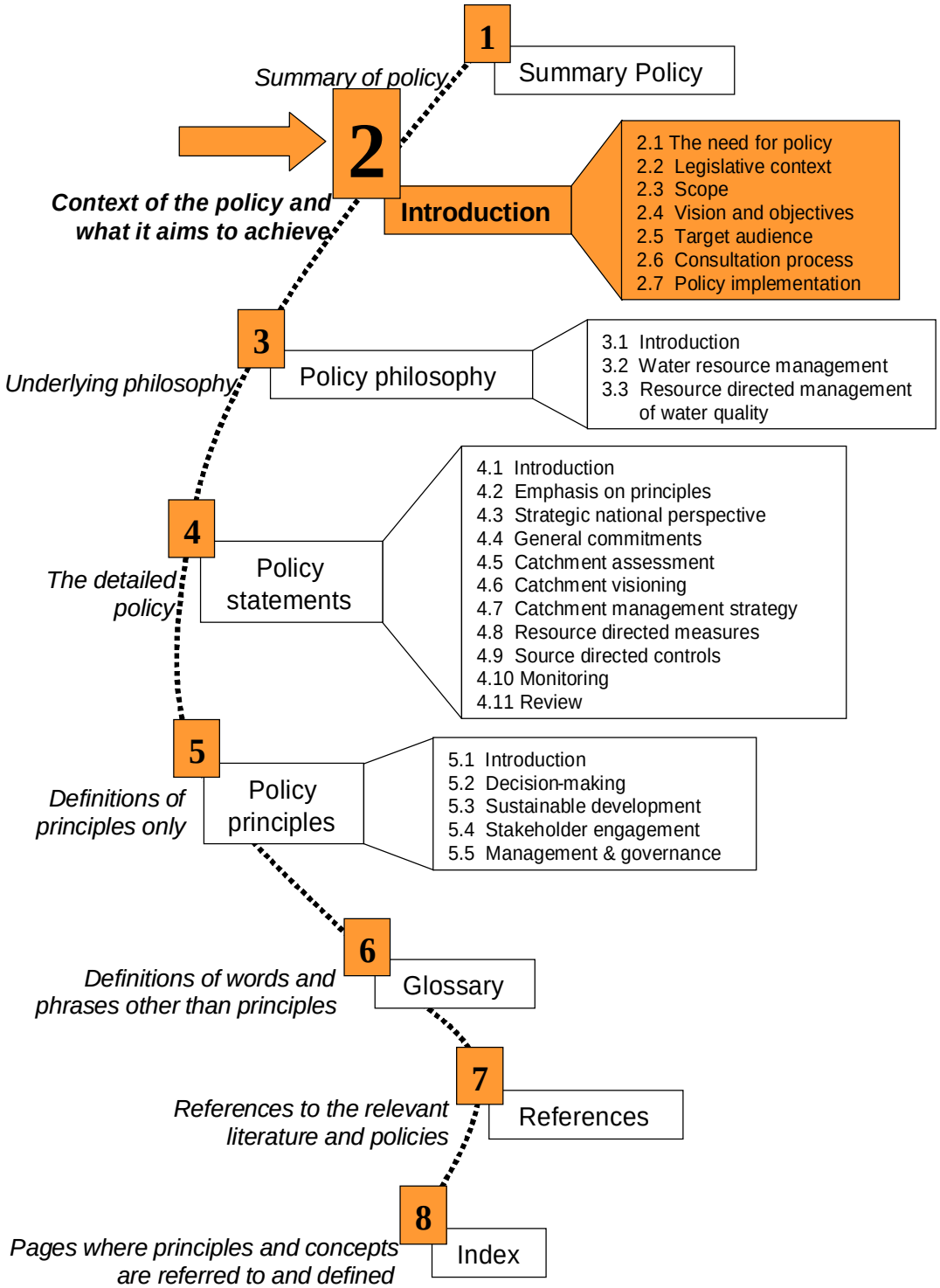
Any indication that creates cause for concern that any of the above is no longer relevant, should result in either (a) an appropriate change to the policy or strategy through effective stakeholder engagement, and/or (b) an improvement in confidence associated with management instruments.

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.

Document roadmap



SECTION 2: INTRODUCTION

PHOTO: K MURRAY

2.1 The need for policy

Significant responsibility

Freshwater availability in the southern African sub-region remains of particular concern because of its unpredictability due to floods and droughts and deteriorating water quality. Freshwater is an essential resource for national development. Its careful management is therefore critical. Estuaries, wetlands and groundwater are often vulnerable to degradation and their water quality is of particular importance and concern.

South Africa's water resources belong collectively to the nation. Since water is a national asset, a significant responsibility is placed on government in their capacity as the trustee of the nation's water resources. The responsibility rests specifically with the Department of Water Affairs and Forestry ("the Department") acting on behalf of the Minister of Water Affairs and Forestry. However, their responsibility extends to ensuring that water shared with countries beyond our borders is also managed considerately.

Why a policy is necessary

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, while decision-making is often complex and may have to be based on uncertain or incomplete data and information.
- Consistent nationwide application of legislation relating to management of water quality is essential.

2.2 Legislative context

Relation to National Water Act

The National Water Act (36:1998) is an 'enabling' Act. That is, it provides broadly based legislation that requires drafting of supporting policies, legislation and strategies for its practical implementation. This policy document is such a policy in the context of resource directed management of water quality.

Relevant chapters

This policy gives substance specifically to the following chapters of the National Water Act:

- Chapter 1: Interpretation and fundamental principles.
- Chapter 2: Water management strategies.
- Chapter 3: Protection of water resources.
- Chapter 4: Use of water.
- Chapter 14: Monitoring, assessment and information.

It is not regarded as the role of this policy to address institutional issues in any depth. This is addressed specifically in this policy's implementation strategy (DWAF, 2006a).

Broader alignment

Although primarily focussed on the National Water Act and resource directed management of water quality in particular, at the time of writing this policy was also closely aligned with a broad spectrum of legislation and policy. An exhaustive list is not provided here. However, the following are the most relevant:

Legislation:

- The Constitution of South Africa (108:1996).
- National Environmental Management Act (107:1998).
- National Water Act (36:1998).

Policy:

- National Water Policy White Paper (DWAF, 1997).
- Environmental Management Policy White Paper (DEAT 1997).
- Draft National Water Quality Management Framework Policy (DWAF, 2003a) (the policy most closely related to this policy).

This policy on resource directed management of water quality will be revised in future to accommodate new legislation or policy if necessary.

Related strategies include:

- National Water Resource Strategy (DWAF, 2004a).
- Source Management Strategy (DWAF, 2003d).
- Remediation Strategy (DWAF, 2004b).

2.3 Scope

Integrated water resource management

This policy is seen as one component of, and aligned with, integrated water resource management. The latter is, in turn, a component of integrated environmental management, as mandated by the National Environmental Management Act (107:1998).

Integrated water quality management

Integrated water quality management is a catchment-focussed, iterative yet systematic process of continual improvement of water quality management based on the dynamic cyclical process of "plan, implement, check and review" usually associated with management systems of the International Organisation for Standardization. This should seamlessly blend and align ("integrate") the following, both "horizontally" (within each spatial scale) and "vertically" (through all spatial scales):

At pollution source scale:

- Resource directed measures with source directed controls relating to water quality management, and

At local scale:

- The achievement of resource quality objectives, and resource water quality objectives in particular,
- Water services development plans, as required by the Water Services Act (108:1997),
- Integrated development plans, as required by the Municipal Systems Act (32:2000) and

At regional scale:

- The water quality component of catchment management strategies,
- The achievement of the water quality management goal within the catchment,
- The achievement of the catchment vision, and

At national scale:

- The National Water Resource Strategy (DWAF, 2004a),
- Nationally consistent approaches to resource directed measures and associated source directed controls,
- The achievement of national water quality management goals.

Scope of water resources

Although holistic water quality management necessarily includes the entire water cycle, this policy relates specifically to water resources falling under the National Water Act. These include watercourses, surface and groundwater, wetlands and estuaries.

Water quality management

Water quality management is the process of administering and controlling the physical, chemical, toxicological, biological (including microbiological) and aesthetic properties of the water in water resources that determine sustained:

- Healthy functioning of aquatic ecosystems; and
- Fitness for use (*e.g.* domestic, recreational, agricultural and industrial).

Fitness for use is a scientific judgement, involving objective evaluation of available evidence, of how suitable the quality of the water is for its intended use.

Resource directed management of water quality

This policy pertains more specifically to how water quality in water resources should be managed, particularly in respect of use and protection. It does not concern itself with the detailed management of those activities that cause impacts on water quality. However, it does address such "source management" (or "source directed controls") to the extent that such management should be driven directly by the requirements of the water resource.

Quality, quantity and ecosystems

The policy recognises that water quality is inextricably linked with water quantity (typically water flow), instream and riparian habitat and aquatic biota, all of which are collectively referred to in the NWA (36:1998) as the "resource quality".

Accordingly, many of the guiding principles are stated in a manner more broadly applicable than only water quality. This broader scope is also inevitable in some formal policy statements, although specific references are made to water quality whenever appropriate.

2.4 Vision and objectives

Vision

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.

Management objective

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"

2.5 Target audience

Target audience

The Department of Water Affairs and Forestry 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.

2.6 Consultation process

Review and opportunities for comment

This policy has been subjected to a limited consultation process involving the Project Team, Project Management Committee, external Reviewers and Project Steering Committee as listed in this document. Comments were also received from other members of the Department, including Regional Offices. Opportunities to comment were also given to the Department of Environmental Affairs and Tourism and to the Department of Minerals and Energy.

This policy and associated management instruments are in the process of being rolled out to Regional Offices of the Department, to provide them with an opportunity to comment.

Previous versions of this policy have been reviewed technically and legally by a number of external reviewers whose comments have been incorporated in this version.

Distribution

The Department intends to further distribute this document to the target audience (see Section 2.5) by providing hard copies as well as making the document available on the Department's web site.

2.7 Policy implementation

2.7.1 General approach

Good governance

Because water quality is affected by, and in turn impacts on, other and stakeholders outside the immediate jurisdiction of the Department, successful implementation will depend heavily on good governance, especially the enabling principle of co-operative governance among government departments.

Guidance versus guidelines

Policy is regarded as providing 'guidance' (implying generality) not 'guidelines' (implying specificity) for decision-making. The above-mentioned management instruments are examples of such 'guidelines'.

Depth of understanding

This policy describes the underlying principles in a way that ultimately aims to achieve a greater quality of decision-making by creating a template for debate and hence a greater depth of understanding. It does this as follows.

- The enabling principles are presented in hierarchies that make explicit possible interrelationships between principles; and
- Each principle acknowledges the underlying values-based assumption that explains why the principle is worth striving for.

Initial pragmatic implementation

Although improved decision-making is the ultimate goal, the Department acknowledges that it will take many years to achieve full implementation of the policy. Accordingly, the Department is deliberately pragmatic about the interim transitional phase, in particular the need to ensure that the inability to fully implement the policy does not impede appropriate socio-economic development. The Department therefore encourages the pragmatic though prudent use of practical and simpler management instruments as a basis for decision-making in the interim phase. These will be progressively replaced by more accurate (and higher confidence) instruments when the demand arises.

2.7.2 Implementation strategy

"Who should do what by when"

Successful implementation of this policy is only possible with a detailed implementation strategy that describes "who should do what by when". The strategy describes (DWAF, 2006a):

- A first level of interpretation of this policy;
- Explicitly how water quality considerations should be incorporated into water resource management;
- Institutional arrangements and responsibilities for actions related to resource directed measures;
- How to give effect to resource directed measures in various water quality management scenarios;
- Capacity creation and maintenance; and
- An action plan with short- and medium-term tasks and time-frames.

2.7.3 Management instruments

Procedures and software decision-support

On the one hand management instruments comprise information documents and detailed procedures that allow the strategy to be implemented. Examples of recent developments include:

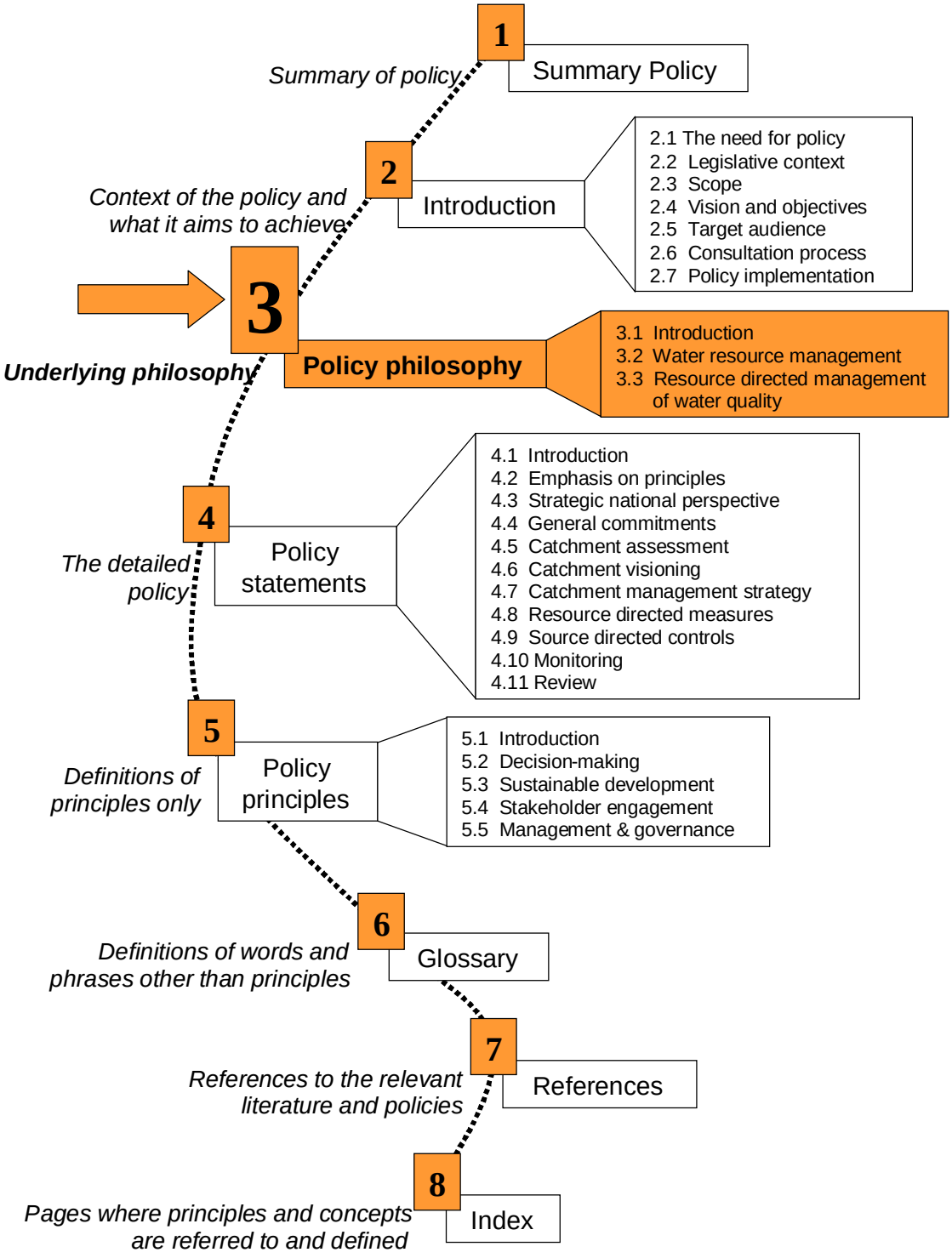
- Conceptual review of water use licence applications from a resource perspective;
- How to conduct a catchment visioning process;
- Guidelines for converting resource water quality objectives to end-of-pipe standards;
- Guidelines for water quality monitoring; and
- Guidelines for setting licence conditions (from a resource perspective).

Management instruments also include software tools that facilitate decision-making, such as:

- Guidelines for quantifying water quality stress and resource water quality objectives; and
- A multiple-criteria decision analysis tool that quantifies the extent to which one would expect a water use licence to be granted, given particular evidence. It also serves as a means to formalise the record of decision.

At the time of writing, the first editions of the above instruments were available and most were undergoing testing (DWAF, 2006c).

Document roadmap



SECTION 3: POLICY PHILOSOPHY

PHOTO: K MURRAY

Principles are indicated in italics.
Use the index to locate the definitions in Section 5 (Policy Principles).

3.1 Introduction

Scope of philosophy

This section describes, in general terms, the underlying philosophy of the policy. The philosophy is ultimately reflected in the principles (Section 5) and how they should be balanced in decision-making.

The philosophy relies heavily on *sustainable development* as a framework for water resource management that takes account of the current realities facing South Africa. For a more general overview of, and background to, the philosophy of sustainable development see DWAF (2006b).

Underlying tenets

First, the ethic of *sustainable development* should be at the core of every aspect of this policy. It should appear everywhere either explicitly or implicitly and, while it may vary in the degree to which it is applied in different circumstances, it should never be totally violated.

Secondly, current national imperatives relating to, for example, the need for sustained *socio-economic enhancement* will determine the degree to which *sustainable development* principles will actually be balanced on a national basis and in individual circumstances.

3.2 Water resource management

Sustainable development

Sustainable development in respect of water resource management seeks to ensure that future generations can meet their own water needs while promoting socio-economic development and improved quality of life for all in the current generation. This can only be done in a manner that uses water resources in general, and water quality in particular, within the ability of ecosystems to satisfy such needs now and in the future.

Broader NWA perspective

The philosophy of *sustainable development* is embodied in several sections of the National Water Act (36:1998). It is necessary to understand this broader context in order to understand the implementation of this philosophy within the more specific context of resource directed management of water quality.

Quality of life

Improving and maintaining the quality of life of all South Africans is the ultimate goal. This ideal is linked inextricably, both directly and indirectly, with maintaining the health of aquatic ecosystems.

Enabling principles

Sustainable development in the context of water resource management is enabled by six main principles:

- *Protection of water resources*;
- *Optimal water use*;
- *Equity between generations*;
- *Current equitable access*;
- *Environmental integration*; and
- *Good governance*.

Ensuring some, for all, forever, together

A number of principles are implicit in the Department's slogan: "Ensuring some, for all, forever, together".

- "Ensuring" refers to the Department's oversight role relating to policy, regulation and auditing.
- "Some, for all," refers primarily to *current equitable access*.
- "Forever" refers to *equity between generations*.
- "Together" refers to *effective stakeholder engagement* (an enabling principle of three of the above six main principles) and *good governance*

Need for socio-economic development

The current national imperative for socio-economic development requires the Department to view the balance between the use of water resources and their protection from a national perspective, and give explicit preference to their use for socio-economic development - especially for poverty eradication and the 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.

Dependence on ecosystems

It is acknowledged that the quality of life of all South Africans is inextricably linked, both 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.

Resource directed measures

Resource directed measures comprise some of the most important instruments that enable improvement of quality of life and such protection of water resources. These measures relate to the management class, the associated resource quality objectives and the *Reserve*.

Management class and resource quality objectives

The intention of the classification system is to ensure that significant water resources are classified explicitly and in a way that seeks to achieve an equitable balance between protection and use. In particular, it serves as a 'first line of defence' against development that is potentially unsustainable.

It does this in the following ways:

- The resource quality objectives should specifically reflect the desired balance between the health of the aquatic ecosystems and the envisaged uses for water in the catchment. This implies a holistic and balanced consideration of social, economic and ecological factors (*i.e. environmental integration*).
- The resource quality objectives should be related to measurable variables that facilitate relevant monitoring.
- Ensuring that the determination of the class is informed by *effective stakeholder engagement* through a catchment visioning process is one mechanism to ensure that management decisions are likely to be "in the public interest" (a mandate of the National Water Act (36:1998)). It also ensures a degree of social, economic, political and ecological 'safety' by minimising the chances that a process might be “derailed” because some stakeholders feel marginalised.

The Reserve

The basic *human needs Reserve* and the *ecological Reserve* both contribute to *sustainable development* in a fundamental way:

- The basic *human needs Reserve* ensures that the current generation can meet its most basic domestic needs for water. This also addresses poverty reduction by helping to set aside the minimum quantity and quality of water needed to sustain a basic or subsistence-level quality of life. Determination of this *Reserve* represents an important application of the principle of *current equitable access*.
- The *ecological Reserve*, on the other hand, seeks to protect aquatic ecosystems in a manner that ensures that they can sustain their intrinsic structure, composition and functions into the future. This addresses the principle of *protection of water resources* and, through this, the principle of *equity between generations.*

Equitable balance

Decision-making by the Department will be based on the philosophy of finding an 'equitable balance' between issues that are in tension. This means finding a balance between competing requirements that is both:

- Just (*i.e.* based on legislation); and
- Fair (*i.e.* based on accepted principles).

The philosophy of *sustainable development* and current political realities combine to define the principles that are appropriate to finding an equitable balance.

Stakeholder engagement

In order to effectively implement a horizontally and vertically integrated approach to resource directed management of water quality, the Department is committed to engaging all stakeholders at all appropriate stages in a manner that is meaningful and cost-effective. Stakeholder engagement is also regarded as fundamental to establishing the most appropriate water uses ('best alternative uses'), and hence management class, that is in "the public interest" (the *optimal water use*). Catchment forums will play an important role in this process.

The most important mechanism for achieving *effective stakeholder engagement* is the catchment visioning process. This entails the development of a collective stakeholder statement of their aspirations (the vision) and a strategy to move towards that vision.

Interim transitional phase

It is inevitable that implementation of the above mechanisms will be gradual and time-consuming. However, the need for appropriate socio-economic development is such that this policy is deliberately pragmatic about the interim transitional phase. Adaptive management is regarded as an essential approach given the complexity and nature of water resources.

3.3 Resource directed management of water quality

Water quality-specific issues

All the above issues apply to water resource management in general and to resource directed management of water quality in particular. However, there are a number of issues that warrant special mention in respect of management of water quality. These are as follows:

Assimilative capacity

The term "assimilative capacity" refers to the capacity of a water resource to assimilate disposed waste, through processes such as dilution, dispersion, and chemical and biological degradation, without water quality changing to the extent that fitness for use or ecosystem health is impaired (DWAF, 1995). Importantly, the assimilative capacity of a water resource depends on many factors. These include chemical processes (*e.g.* adsorption), physical processes (such as aeration and sedimentation), and biological processes (*e.g.* uptake by plants and micro-organisms), and these processes can vary considerably in terms of their time-scales. "Assimilation" can occur by processes such as dilution, adsorption, degradation or metabolism to other (either less or more harmful) products, physical removal (*e.g.* via volatilisation) and biological absorption and transformation (*e.g.* bioaccumulation) (Roux *et al.*, 1999).

The accurate quantification of assimilative capacity in a way that allows it to be used as a useful management instrument is an extremely complicated process. While the Department acknowledges the existence of the general phenomenon of assimilative capacity, it is Departmental policy to use this as a routine management instrument only in the particular context of dilution capacity. This will specifically be related to the concept of allocatable water quality.

Allocatable water quality

Understanding the basic concept of allocatable water quality is complicated by the many water quality attributes that may be involved.

In general, each type of user in a catchment may require each of a number of attributes to fall within some pre-determined range for that water to be considered "fit for use". These attributes may vary from concentrations or loads of chemical substances, to biological responses (such as toxicity), and measures of physical pollution.

For water to be judged 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.

Just as a quantity of water can be "used", so can water quality. 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 (Reserve, international obligations, etc.) and current lawful uses (see Figure 1.1).

- Secondly, it can also be more formally regarded as the maximum worsening change in any water quality attribute away from its present value, which will still maintain it within a pre-determined range that reflects the desired future state, typically defined by a resource quality objective (RQOs). If the present state is outside of the pre-determined range, the allocatable water quality is zero.

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

Monitoring

Effective monitoring and reporting in respect of resource directed management of water quality is essential. To achieve this, the resource quality objectives chosen to represent the management class (and hence the catchment vision) should be clearly related to individual monitoring variables. These and other indicators must provide information that allows water resource managers to assess:

- The degree to which catchment management strategies are being successfully implemented; and
- The status of the resource from the perspective of *sustainable development*.

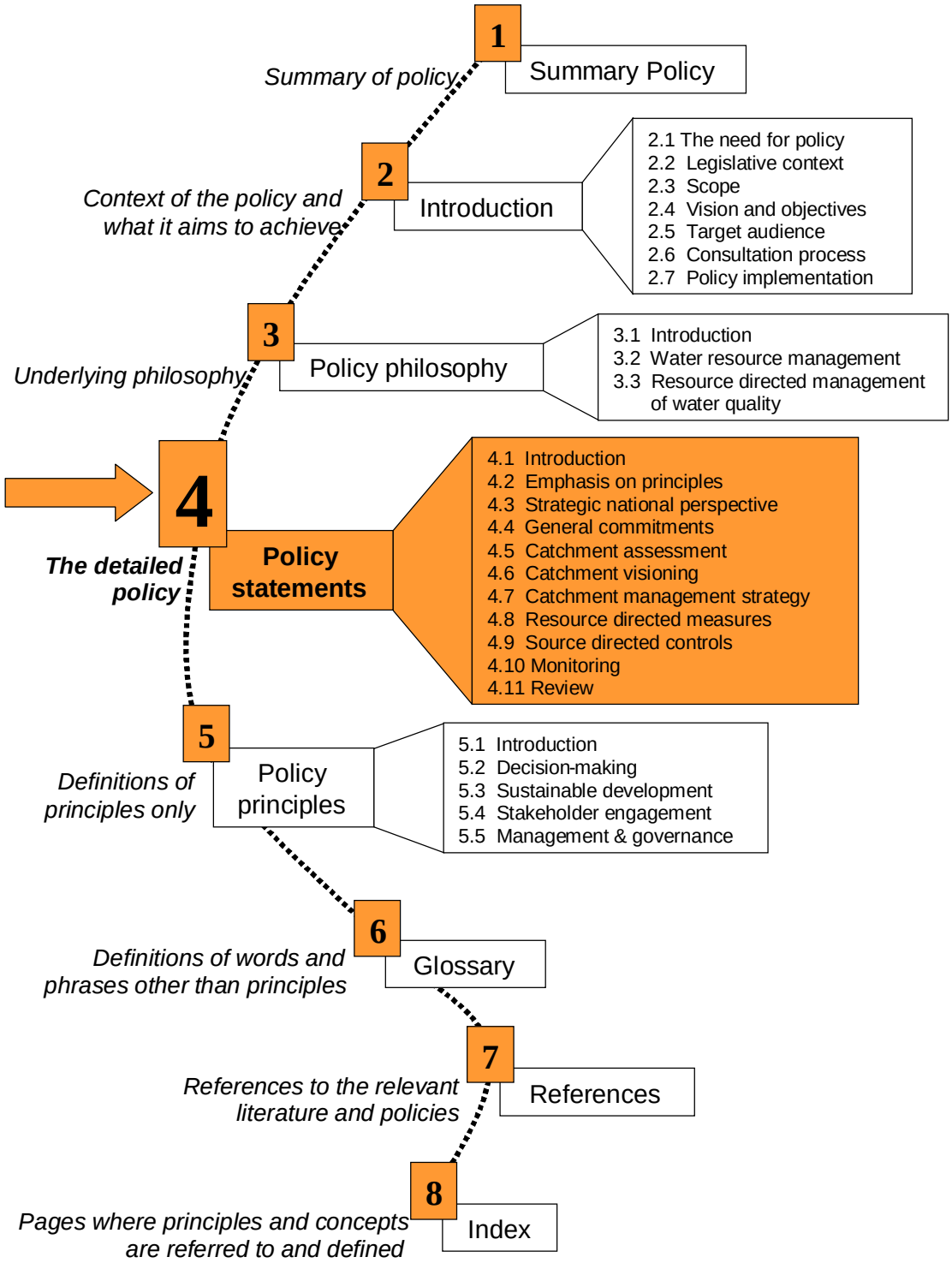
Monitoring in general should be adequate to allow an assessment of the effectiveness of implementation of the policy and associated strategy.

Importantly, this monitoring must feed back into regular review of policy and strategy so that they can be updated if necessary.

PSIR monitoring

The Department acknowledges that monitoring Pressures (P) on water quality, the State (S) of water quality, the Impacts (I) of inadequate water quality (on ecosystems and society), and the decisive Responses (R) of society to inadequate water quality, will ultimately be important in holistically assessing water quality. However, it also acknowledges that these should only be considered in the interim transitional phase if necessary, simple and cost-effective.

Document roadmap



SECTION 4: POLICY STATEMENTS

PHOTO: K MURRAY

Principles are indicated in italics.

Use the index to locate the definitions in Section 5 (Policy Principles).

4.1 Introduction

Structure

The sub-sections that follow first describe the emphasis that is placed on principles and then state the policy at two levels:

- The first is the Department's strategic perspective at national level. It addresses the broader issues facing the nation.
- The subsequent sub-sections deal with the second level, namely the specific resource directed management of water quality.

The overall strategies of continual improvement and adaptive management are regarded 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.*, 2003).

4.2 Emphasis on principles

4.2.1 Need for principles

Responsibility

Acknowledging the intricate and fundamental role of water quality in society, the Department embraces the responsibility placed upon it as the national custodian of South Africa's water resources.

Competition

Difficulties will typically arise out of competition between, and within, social, economic and ecological ideals. Notwithstanding the degree to which the National Water Act (36:1998) endeavours to restrict competition to some extent by allowing for the Reserve, demand for the remaining water will exceed supply, as it already does in many instances. The needs and preferences of water users for the limited supply of water will continue to differ across the country.

The problem of resource directed management of water quality is therefore reduced to finding approaches that can deal with such competition.

Equitable management of water quality

The Department envisions a solution lying in the phrase "equitable balance". This the Department understands as a "balance between competing requirements that is just and fair in the sense of being based on laws and accepted principles". This policy document strives to provide a systematic framework to enable equitable management of water quality.

'The rules of the game'

A strong emphasis has therefore been given in this document to the underlying principles of water resource management. The practical difficulties faced in everyday decision-making in resource directed management of water quality are significant. A clear description of underlying principles allows concise yet powerfully comprehensive policy statements to be made. The principles are, in effect, 'the rules of the game'.

Sources of principles

Many of the principles arise from, and are common to, a variety of policies and legislation, including the Constitution (108:1996) (see Section 2.2). The most important principles in the current context are those upon which decision-making is formally based. Other principles drive actions in management processes that create the environment in which these decisions can be made more effectively.

The most relevant principles occur in the National Water Policy White Paper (DWAF, 1997). This document adds value to them by providing a more currently relevant interpretation of them in the context of resource directed management of water quality.

4.2.2 Applying the principles

Principles and values

The principles presented in this policy capture a basic value system that:

- Aims to improve the quality of life of all South Africans, and
- Is appropriate for water resource management in general and resource directed management of water quality in particular, and
- Strives for consistent and effective implementation of resource directed management of water quality policy nationwide.

The principles specifically reflect the policy philosophy that is presented in Section 3.

Administrative mechanisms

The very nature of the supply and demand imbalance, and the competitive nature of humans, is such that special administrative mechanisms will be necessary to ensure equitable management of water quality. The principles underpinning these mechanisms are well defined to make their application to resource directed management of water quality in particular as clear as possible. Misinterpretation and possible ambiguities are thereby minimised. Importantly, they should be clearly in line with the Constitution (108:1996) and other relevant legislation.

Should this ideal be achieved (demonstrably), the inevitable competition that will arise can be addressed in a constitutional and equitable manner.

Decision-making

Decision-making is a core function of the Department. Defining principles that enable sound decision-making will facilitate *good governance* and support alignment of the Department's decision-making process with the Promotion of Administrative Justice Act (3:2000). They will also facilitate the search for optimum solutions in situations where apparent contradictions may exist.

Sustainable development

Sustainable development should always be a conscious concept in the minds of decision-makers. Defining the enabling principles provides a basis for understanding the inevitable tensions that arise between them in practice. With time, the principles can not only be more readily associated with specific scenarios, but they will also be able to be balanced in a way that, ultimately, can demonstrably and defensibly be associated with *sustainable development*.

Stakeholder engagement

The new era of participatory government demands *effective stakeholder engagement*. Understanding the enabling principles, and their inter-relationships, will facilitate more efficient and effective engagement and hence decision-making that is truly in the public interest.

Management and governance

The generic principles that enable sound management and governance are crosscutting. Their application is as important for successful policy implementation as those enabling decision-making, striving for *sustainable development* or engaging with stakeholders.

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.

In the spirit of *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) management instruments when the demand arises.

4.3 Strategic national perspective

4.3.1 Quality of life

Quality of water and quality of life

A wide variety of properties of the water in a stream, river, impoundment, wetland, aquifer or estuary determine how well that water is suited for human use and for supporting the ecosystem comprising that resource. Dissolved chemicals corrode or scale water distribution systems. They subtly control the biological functioning of the animals and plants living in the water. Physically suspended solids clog drip irrigation systems, reduce light penetration into water bodies and interfere with fish respiration. Faecal pathogens increase human morbidity, in turn impacting on our productivity and hence our potential for social and economic development. A degraded water body assaults our aesthetic sense instead of providing us with a spiritual 'sense of place'. All impact ultimately on our quality of life as South Africans.

The water quality challenge

Controlling the physical, chemical, radiological, toxicological, biological and aesthetic properties that constitute the 'water quality' of our water resources in an equitable manner is an exciting challenge. It rates in importance and complexity with many of the other major challenges facing South Africans and cannot be considered in isolation of them. Impacts on water quality not only cut across all aspects of South African society, but also have obvious international interdependencies. This challenge knows no boundaries. Furthermore, water of adequate quality is not only fundamental to a good quality of life. It is central to life itself.

Optimism and realism

The Department recognises that striving to achieve the vision of this poilicy must be driven by optimism. This instinctively stimulates commitment and enthusiasm. In turn, these create an atmosphere in which problem solving can be genuinely creative.

Accordingly, the Department acknowledges the enormous challenges faced by South Africa, and indeed the whole African continent, in these early years of the 21st century. These challenges remind us that lofty ideals in water resource management may not be attainable if the broader issues that face society are not adequately addressed.

Pessimists might regard such realism as ultimately disabling. However, far from being disabling, these issues, if viewed positively, can give true purpose to life, an essential element of quality of life.

The Department therefore enthusiastically accepts its role in addressing these wider issues while searching for optimum solutions to the more immediately obvious concerns relating to ever-increasing demands for water, water resource degradation, and inadequate awareness of the natural environment.

4.3.2 National challenges

4.3.2.1 Climate change

Planning

The Department acknowledges that 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. It is therefore the Department's policy to ensure that planning will take account of credible predictions relating to water quality, to ensure that attainment of desired future states (reflected in the resource management class) for water resources is feasible.

4.3.2.2 HIV/AIDS

Demographics

Besides the untold human suffering brought upon individuals, families and communities alike, the Department recognises that the inevitable demographic changes caused by HIV/AIDS can have enormous social, economic and ecological implications for planning for the timely provision of water (Ashton and Ramasar, 2002):

- Inadequate supplies cause unnecessary hardship.
- Over-supply impacts negatively on *water conservation*, and hence on *protection of water resources* and *optimal water use*.

It is therefore the Department's policy to ensure that:

- Predictions of future demographic changes take adequate account of the HIV/AIDS pandemic, and that
- In particular, catchment visioning and catchment management strategies do the same.

Socio-economic profiles

Changes caused by HIV/AIDS in socio-economic profiles of communities receiving water supplies can cause difficulties in paying for these services (Ashton and Ramasar, 2002). This may lead to extra pressure being put on local water resources (surface waters and groundwaters) in communities where the use of such resources presents an apparent alternative. This may expose such communities to lower quality water with its concomitant health risks.

Water and general health

The Department recognises the central importance of water of good quality for *socio-economic enhancement* at all levels. In particular, it recognises the importance of maintaining adequate water quality, particularly microbial, in natural water resources used directly by communities without adequate treatment. Although this situation is improving rapidly throughout South Africa by the provision of formal water supplies, some poor communities remain directly dependent on natural water resources, either permanently or when formal supply systems break down. Under these circumstances, their vulnerability to waterborne diseases is increased. The recent outbreaks of cholera and typhoid have galvanised the Department's commitment to addressing its responsibilities in this regard.

Impacts on people with HIV/AIDS

People with compromised immune systems face far greater risk from waterborne diseases than healthy people. Inadequate water quality, particularly microbial, will increase the incidence of waterborne diseases and related mortalities (Ashton and Ramasar, 2002). In certain instances, a small risk of degradation of groundwater, albeit likely to be highly localised, exists when relatives are buried in places unsuitable for graveyards (Ashton and Ramasar, 2002). In communities where:

- Water is derived from local surface water or groundwater resources, and
- Such water is untreated or inadequately treated and used for domestic purposes,

the resource water quality can impact negatively on local health levels.

Co-operative governance

It is therefore the Department's policy to:

- Work closely with the Department of Health in a spirit of *co-operative governance* to address all the above issues, and
- To implement appropriate water quality monitoring programmes wherever this is feasible.

Decreased productivity

Decreased productivity of staff members infected with HIV/AIDS will occur and loss of skilled and semi-skilled staff leads to increased staff turnover across all sectors (Ashton and Ramasar, 2002). These result in:

- Increased training of new staff, and hence increased costs, and
- Potential inadequate execution of water resource management programmes (*e.g.* lack of continuity of water quality monitoring programmes), and
- Possible delays in achieving water resource management objectives.

It is therefore the Department's policy to ensure that such impacts are anticipated and properly planned for, to ensure continuity in the execution of programmes relating to resource directed management of water quality.

Perceptions of HIV/AIDS as a waterborne disease

HIV/AIDS is still perceived by some to be a waterborne disease. Although indicative of a desperate need for better health education, it also fundamentally undermines the ability of the Department to improve society's perception of the true value of water and water quality.

It is therefore the Department's policy to not only promote an understanding of the positive aspects of water and water quality but also to ensure that incorrect perceptions are effectively eliminated.

4.3.2.3 Poverty

Poverty, dignity, sustainable development

The Department recognises that poverty:

- Diminishes human dignity, a quality that is specifically respected and protected by the Constitution (108:1996).
- Is associated with a vulnerability that can prevent the poor from achieving *current equitable access* to water resources.
- Significantly hampers efforts to apply the principle of *protection of water resources* and hence achieve at all times *sustainable development*, because the poor are usually more concerned with satisfying simple short-term physiological needs (water, food, shelter, etc.) than satisfying the much higher self-actualisation needs associated with protecting the natural environment for its intrinsic value (or for future generations). (This is an interpretation of Maslow's hierarchy of needs (Maslow, 1970).)

It is therefore the Department's policy to place poverty eradication efforts as a high priority.

Reserve

Accordingly, as an essential first step towards poverty eradication, it is the Department's policy to apply with vigour the concept of the *Reserve* to ensure that:

- Basic human needs are met for all South Africans, and
- The health of the ecosystems that supply this water is ensured.

Water as an enabling element

The Department recognises the core importance of water of good quality for *socio-economic enhancement* at all levels. It is therefore policy to give particular emphasis to developments in which the socio-economic enhancements demonstrably result in poverty eradication. The Department also recognises the need to further develop and refine procedures to create sustainable capacity in all stakeholders, particularly the poor, to ensure that they are empowered to take their rightful place in *effective stakeholder engagement*.

Corruption

The Department recognises the utterly unacceptable nature of corruption in all its forms and the particularly disastrous consequences in situations when resources are limited. It is therefore the Department's policy to prevent corruption by meticulously ascribing to the principles of *good governance* at all times .

4.3.2.4 Racial inequities

Commitment

The Department recognises the enormously negative impacts past racial policies have had on South Africans. It therefore commits itself to addressing these in an equitable manner in its efforts to achieve *sustainable development* of the nation's water resources.

Equitable allocation meta-principle

It is the Department's policy to apply the following enabling principles relating to *equitable allocation* of water quality:

- *Sustainable development* is an overriding principle that should not be totally violated under any circumstances.

- *Equality* (non-discrimination) is also an overriding principle that may not be violated, except in one particular instance: *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 National Water Act (36:1998) were discriminatory.

4.3.2.5 Gender inequities

Inadequate role of woman

The Department recognises the inadequate degree to which women have been permitted to play a role in water resource management in general and rural water affairs in particular. Accordingly, it is the Department's policy to ascribe vigorously to the principle of *gender equity* and to apply *redress* and *equality* appropriately to achieve an ultimate equitable state. Special attention will be given at local level to ensuring that *rural gender equity* is achieved.

4.4 General commitments

4.4.1 Introduction

To principles

The Department is committed to the policy principles as defined in this document, particularly to encourage debate and hence deeper understanding, and to their gradual introduction and application as described in this policy.

To integrated water quality management

The sequence of sub-sections that follow is broadly aligned with the dynamic cyclical process of "plan, implement, check and review". The Department:

- Recognises the appropriateness of this for integrated water quality management, and
- Commits itself to the following principles of integrated water quality management.

Effective stakeholder engagement
Sustainable development
Adaptive management
General legislative alignment
Sound financial management

To effective stakeholder engagement

In particular, the Department commits itself to the principles of *effective stakeholder engagement* at appropriate stages of the integrated water quality management process, particularly when this is closely aligned with catchment visioning. Furthermore, the Department is committed to giving effect to this, in line with the National Water Act (36:1998), by devolving and decentralising decision-making responsibilities through the creation of water management institutions, and catchment management agencies in particular. The Department also acknowledges the important role that will be played by catchment forums in representing the interests of individual stakeholders.

To general legislative alignment

The Department commits itself to the principle of *general legislative alignment* and the related principle of *co-operative governance*. In the specific context of resource directed management of water quality, it recognises the critical importance of these principles in ensuring co-ordination in planning and water use authorisations.

4.4.2 Decision-making

4.4.2.1 Principle-based decision-making

Overarching policy

It is the Department's policy to apply *principle-based decision-making*, whenever appropriate, to resource directed management of water quality.

Principle inclusiveness

It is specifically policy to ensure that all relevant principles are identified. Relevant principles include those that are:

- Specifically noted in the Constitution (108:1996), any other appropriate Act (applying *general legislative alignment*), or in this policy as being relevant in the given context, or
- Agreed by consensus among all stakeholders as being relevant (through *effective stakeholder engagement*).

Principles that guide decisions should not necessarily be limited to those that are described in this document.

Due diligence

It is policy to regard a principle as having received "due diligence" when:

- It is defined so by other relevant legislation, if any, (applying *general legislative alignment*), and
- All stakeholders agree by consensus that this is so (through *effective stakeholder engagement*) and it does not conflict with any legislation (*general legislative alignment*), and
- It is consistent with any relative weighting assigned to it.

Integrated balance

It is policy to regard the relative balance (weighting) given to principles as appropriate when:

- A relevant weighting has been applied as described in this policy, or
- All stakeholders agree by consensus that this is so (through *effective stakeholder engagement*) and it does not conflict with any legislation (*general legislative alignment*).

Given the complexities of decision-making in resource directed management of water quality created by having to consider multiple issues, it is the Department's policy to apply recognised quantitative or qualitative multi-criteria decision-analysis techniques whenever feasible and appropriate.

Due process

It is policy to regard a process or procedure as having been executed with *due process* when:

- Existing guidelines for the process have been adhered to, or, should such guidelines not exist,
- All stakeholders agree by consensus that this is so (through *effective stakeholder engagement*) and it does not conflict with any legislation (*general legislative alignment*).

4.4.2.2 Multiple lines of evidence

Managing uncertainty

The Department acknowledges that quantities used as a basis for resource directed management of water quality:

- Are often based on approximate methods of calculation, and
- Have uncertainties (or confidence levels) that are difficult to quantify.

When using such quantities as a basis for decision-making, the Department will:

- Openly acknowledge the known underlying assumptions of such calculations, to ensure decision-making is informed, and
- Use multiple lines of evidence (*i.e.* independent sources of information or methods of calculation) whenever this is feasible and cost-effective, and
- Balance this approach with the need for simplicity, particularly in the interim transitional phase.

4.5 Catchment assessment

Definition

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 2003c).

Enabling principles

The following main principles enable catchment assessments:

- *Effective stakeholder engagement*,
- *General legislative alignment*,
- *Environmental integration*, and
- Prudent pragmatism.

Needs of the Act

The Department acknowledges the need to meet certain requirements prescribed by Section 9 of the National Water Act (36:1998) regarding the contents of catchment management strategies. It is the Department's policy to meet these needs by applying the enabling principles of catchment assessment with special emphasis on *effective stakeholder engagement* reflected in a preliminary catchment visioning exercise. The principle of *general legislative alignment* will also be applied, particularly in ensuring alignment with the Promotion of Access to Information Act (3:2000). Catchment assessment is regarded as one of the planning functions of integrated water quality management.

Understand to improve

The Department acknowledges the complexities and uncertainties associated with water resource management and therefore the need for a sound understanding of catchment processes and issues. It is therefore the Department's policy to improve understanding by striving for a holistic comprehension of all catchment processes and issues, based on adequate and objective observations far as this is possible. This should occur before catchment management decisions are taken that are intended to improve the current state of water resources. This, in effect, applies the principle of *environmental integration*. However, this will be balanced with *prudent pragmatism*.

Flexibility in scope

The Department acknowledges specifically the need for *flexibility* in the scope of catchment assessment studies (DWAF, 2003c). In particular, they should take appropriate account of:

- The *Reserve*;
- Other user requirements as reflected in the outcome of the catchment visioning process;
- Catchment size;

- Management requirements that may vary from catchment wide status and trends to more detailed 'cause-effect' information;
- Spatial and temporal resolution within each catchment aligned with the management requirements; and
- The possible iterative and evolving nature of catchment assessments.

Spatial scale

It is the Department's policy to ensure that catchment assessments take place on a spatial scale that appropriately balances:

- The complexities of catchment management;
- The principle of *environmental integration*; and
- The need to devolve water quality management to the lowest practical level.

Water quality issues and requirements

The Department regards a catchment assessment as the primary source of initial information on:

- Water quality issues,
- Water quality aspects of the Reserve,
- Water uses, current and future, and hence
- Water quality requirements, both current and future.

The catchment assessment study should therefore characterise the water quality requirements within the catchment to a degree of detail that can adequately inform the ongoing catchment visioning process, and resource directed measures (RDMs). The catchment assessment should specifically provide a statement on the present state of water quality, the degree of compliance with the vision and highlight those corrective actions that are needed to improve or maintain water quality.

Models

The Department encourages the use of computer models as tools for supporting decisions relating to resource directed management of water quality. However, it is the Department's policy to apply *prudent pragmatism* and use less input resource intensive (possibly qualitative) approaches when the required degree of confidence in the results warrants this. This will be done in a manner equivalent to, and consistent with, that outlined below for determining RDMs at different levels of confidence.

Data assessment

To facilitate the evolving catchment visioning process, the Department encourages a presentation of data and associated assessments that is:

- Simple and easy to understand by non-experts; and
- Accurate and unambiguous to ensure that misinterpretation is avoided or minimised.

4.6 Catchment visioning

Definition

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

- Collective statement from all stakeholders of future aspirations of 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.

Overarching policy

The Department regards the catchment visioning process as an essential planning instrument that drives all aspects and all stages of integrated water quality management.

The Department specifically acknowledges that catchment visioning is an indispensable component of any strategy, at any level. It also plays an essential part in ensuring that use of the country's water resource is "in the public interest" (a specific mandate of the National Water Act (36:1998)), by facilitating participative management and focussing on the quality of life, in its broadest sense, of stakeholders.

Accordingly, it is the Department's policy to:

- Actively promote and apply all the enabling principles of catchment visioning; and to
- Ensure that the process is socially, economically, politically and ecologically 'safe' (*i.e.* unlikely to be 'derailed' because some stakeholders may feel marginalized).

Enabling principles

The following main principles enable catchment visioning:

- *Effective stakeholder engagement*;
- *Principle-based decision-making*;
- *Adaptive management*;
- *General legislative alignment*;
- *Creative problem solving*; and
- *Prudent pragmatism*.

Nature of the vision

It is the Department's policy to ensure that each catchment vision and associated strategy is:

- Acknowledged by all stakeholders as iteratively improving (*i.e.* subject to *adaptive management* principles) based on a "co-evolution of understanding", and
- Reached by consensus, and
- Strongly principle-based (applies *principle-based decision-making* and *general legislative alignment*), and
- Well aligned with the National Water Resource Strategy (DWAF, 2004a) and other national visions and strategies.

Vision and strategy contents

Stakeholders will be encouraged to encapsulate in their vision statement and associated strategy, their considerations relating to *sustainable development* and, in particular, *protection of water resources*, *optimal water use*, *current equitable access* and *equity between generations*.

Meaningful involvement

The Department will apply the principles of *awareness creation* and *empowerment through information* by ensuring stakeholders have an understanding of the water quality management concepts that are necessary to enable their meaningful involvement.

Common visioning

The Department acknowledges that a sense of common purpose promotes buy-in and hence ownership, co-operation and accountability in efforts to move towards a vision. It is therefore the Department's policy to strive for a vision statement and a corresponding strategy that is accepted with consensus among all stakeholders.

Progressive realisation

It is the Department's policy to facilitate a progressive realisation of the vision in accordance with the principles of:

- *Adaptive management*;
- *Creative problem solving*; and
- *Prudent pragmatism*.

Furthermore, in the interim transitional phase, 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.

Relationship with catchment assessments

It is the Department's policy to ensure that preliminary catchment visioning determines the initial scope of catchment assessment studies (that describe the local context) that these, in turn, facilitate refined catchment vision statements and strategies.

RDMs and catchment management strategy

Similarly, it is the Department's policy to ensure that the products of the catchment visioning exercise can adequately inform both:

- The determination of resource directed measures (RDMs), *i.e.* classification, resource quality objectives and the Reserve; and
- The progressive development of a catchment management strategy.

Again, the Department recognises the iterative nature of the RDMs and catchment management strategy feeding back into the catchment visioning process.

Lower confidence approaches

The Department acknowledges the need to apply *prudent pragmatism* in special circumstances, and especially in the interim transitional phase, to 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 later process that is more inclusive.

Relative emphasis on principles

The Department acknowledges that two main factors determine the degree of confidence that can be placed in the process and ultimate vision, namely:

- The level and effectiveness of stakeholder engagement; and
- The availability of relevant catchment data, and water quality data in particular.

Under circumstances when low confidence is considered acceptable, it is the Department's policy to carry out the catchment visioning process:

- Within practical yet realistic time limits; and
- With readily available expertise, data and information.

Within the limits of these constraints, the enabling principles associated with *effective stakeholder engagement* are given the following relative emphasis:

- Efficiency and cost-effectiveness (relating to the principle of *engagement efficiency and effectiveness*) are given high priority by minimising direct engagement with stakeholders.
- Although *environmental integration* is regarded as important, the degree of attention afforded to it will be restricted to the expertise and experience of those taking part in the process and to the use of readily available data.
- *Comprehensive consultation* will be compromised by decreasing stakeholder engagement as the acceptable degree of confidence decreases. Nevertheless, it is the Department's policy to strongly encourage officials to express the likely perspectives of the water users in the catchment to the best of their abilities.
- The enabling principles of c*onstructive co-operation* will be articulated at the start of the process and officials will adhere to them in their discussions in an effort to begin creating an enabling environment for a subsequent process that will increase the confidence in the result.

4.7 Catchment management strategy

Overarching policy

The Department acknowledges:

- The strategic nature of water management areas because of their large temporal and spatial scales, and
- The complexities, uncertainties and hence risks associated with water quality management on such scales, and
- The importance of devolving water quality management efforts to the lowest practical level.

Accordingly, it is the Department's overarching policy in respect of the water quality component of catchment management strategies to:

- Give effect to the National Water Resource Strategy (DWAF, 2004a), and
- Sub-divide the water management area into practically manageable units, and

Effectively manage for the chosen management class by giving effect to resource quality objectives, resource water quality objectives and the Reserve, through the definition and equitable attainment of source management objectives (DWAF, 2003b), and

- Strongly encourage the clear and consistent application of all the processes and policy principles of this policy on resource directed management of water quality, particularly related to the following:
  - *Integrated water quality management process*
  - *Catchment visioning process*
  - *Sustainable development*
  - *Adaptive management*
  - *Effective stakeholder engagement*
  - *General legislative alignment*
  - *Creative problem solving*
  - *Good governance*

Adaptation of these principles to catchment-specific circumstances is specifically encouraged when this may be needed or applicable to convey greater clarity or improve relevance.

Catchment visioning

It is the Department's policy to ensure that the catchment management strategy is firmly guided by catchment visioning taking place for:

- The smaller water management units within a catchment, and
- The water management area as a whole.

Phased implementation

Recognising that:

- Water quality problems in some areas are more acute than others, and
- Cost-effective use of human and financial resources (both from local sources and from the Department) is essential,

it is the Department's policy to encourage initial implementation, particularly in the interim transitional phase, in those management units in which the need is most urgent.

4.8 Resource directed measures

Importance

The Department acknowledges:

- The statutory requirements of resource directed measures (RDMs), comprising the resource classification system, determination and implementation of the Reserve and determining and complying with resource quality objectives (RQOs); and
- The fundamental importance of these measures in applying the principle of *sustainable development*.

Independence

It is the Department's policy to ensure an adequate degree of independence and objectivity in:

- The resource classification system,
- Determining the Reserve, and
- Determining RQOs,

in order to ensure that:

- Local catchment priorities are appropriately balanced with broader spatial and temporal perspectives (*e.g.* at water management area level and/or national level), and
- RDMs are consistently applied nationwide.

Local knowledge

Notwithstanding the need for a degree of independence, it is the Department's policy to ensure that local knowledge is effectively used in RDMs.

4.8.1 Degree of confidence

Levels of confidence

The Department acknowledges the importance of a comprehensive understanding of catchment processes, based on adequate and objective observations, and hence the importance of establishing RDMs with good confidence in their accuracy.

Nevertheless, in the interim, in the absence of highly confident RDMs, it is the Department's policy to apply *prudent pragmatism* by permitting, in special circumstances, RDMs at lower confidence levels.

Factors affecting confidence

It is recognised that there are many factors determining the degree of confidence that should be achieved in any particular RDM sub-process. Among others, these factors may include the following:

- The immediate objective to which the outcome of the RDM process is to be applied.
- The degree of water quality stress.
- The likely impact of proposed water uses on water quality. This will depend on both the nature of the water use, the ecological importance (including scarcity) and the sensitivity of the water resource.

It is therefore the Department's policy to define and apply RDMs to lesser degrees of confidence based on the degree to which the above factors apply on a case-by-case basis. Due consideration will also be given to any other factors that might influence the acceptable degree of confidence.

Accountability

Furthermore, if:

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

these may be considered as reasons for adopting an approach of lower confidence. However, under all circumstances of RDMs being established at levels of confidence that may be compromised for any of the above reasons, it is the Department's policy to explicitly acknowledge, and manage accordingly, the likely higher associated risks. Accordingly, it is policy to give particular emphasis to a *precautionary approach* and *adaptive management* and, within the latter, a special emphasis to *receptiveness* and *flexibility* in subsequent management.

Compatibility

The chosen level of confidence for RDMs will define the minimum level of confidence required for all aspects of RDMs, from catchment visioning through to determining resource quality objectives. For example, if high confidence resource quality objectives are required, related processes upon which these depend must also be done to a high level of confidence, not lesser levels. Equivalently, a low confidence catchment visioning process will not warrant a high confidence determination of the class and resource quality objectives.

4.8.2 Allocatable water quality

Quantification

It is the Department's policy to quantify, whenever possible and appropriate, the allocatable water quality in terms of individual water quality variables of concern, including biological and/or ecosystem effects. These variables are determined by the water users (both current and future) in the catchment.

Confidence

The Department recognises that the confidence that can be placed in the accuracy of the allocatable water quality depends on the confidence that can be placed in the following three factors:

- The objectives (*e.g.* resource quality objectives).
- Knowledge of the current state of water quality.
- The flow patterns upon which allocatable water quality loads might be based.

Interim measures

Since allocatable water quality is defined in terms of objectives, interim measures may be necessary when the latter are not available and urgency dictates that some measure, albeit conservative or with low confidence, of allocatable water quality is required (*e.g.* a measure of the degree of stress is required).

Initial estimate

Under these circumstances it is the Department's policy to use as an initial estimate, preliminary RQOs related to water quality defined in terms of, for example, the target water quality range, or other criteria, defined for the South African water quality guidelines (when available and appropriate) for the water users.

4.8.3 Water quality stress

Indicators of stress

The Department recognises the need to determine whether or not a water resource is able to adequately meet the needs of water users in respect of their water quality requirements. The Department recognises the allocatable water quality as an appropriate indicator. A positive amount for a water quality attribute means that the resource is unstressed; a negative amount for a water quality attribute means that it is stressed.

Confidence

The Department recognises that the confidence that can be placed in the calculated degree of stress is determined by the degree of confidence that can be placed in, or the accuracy of, the allocatable water quality.

Iterative nature

The Department acknowledges the iterative nature of:

- On the one hand, defining stress in terms of objectives and, on the other hand,
- Basing the level of confidence with which these objectives should be determined on the degree of water quality stress.

Accordingly:

- Should the determination of stress based on an initial estimate of allocatable water quality, indicate that the water resource is stressed, and
- This is considered unreasonably biased towards *protection of water resources*, (*i.e.* too conservative),

the Department will encourages determination of said objectives with greater accuracy.

4.8.4 Resource management class

Sustainable development

The Department regards the resource management class as capturing the most desirable long-term balance between *protection of water resources*, *optimal water use*, *equity between generations* and *current equitable access*. This balance should be achieved with adequate consideration of *environmental integration* and application of *effective stakeholder engagement*. The sustained achievement of the resource management class is then regarded as a minimum requirement (or 'first line of defence') that facilitates *sustainable development*.

Special considerations

Special consideration will be given to resources that are vulnerable, sensitive or scarce and in an unimpacted or largely-unimpacted state. Groundwater will be regarded as vulnerable by default unless it can be shown otherwise (DWAF, 2000).

Spatial scale

It is the Department's policy to sub-divide resources into management units for which single objectives are sensible from a management and ecological point of view. However, the interdependence of such units will also be considered. It is also acknowledged that resource units practical for resource directed management of water quality may differ from those chosen for water quantity management.

National balance

An overall appropriate national balance of strict protection of some resources on the one hand with use (and possible degradation) of other resources on the other, will be necessary.

Relation to pollution

It is the Department's policy to regard the classification system as the primary mechanism for making the definition of pollution in the National Water Act (36:1998) (see Glossary) operational in the current context of resource directed management of water quality. As a consequence, this allows for different levels of impact for different water resources, through their alignment with the catchment visions.

Attaining the class

If the present state of a water resource is worse than the management class, it is the Department's policy to attain the management class in an equitable manner over an achievable time period. Emphasis will be placed on appropriate source directed controls.

4.8.5 Resource quality objectives (RQOs) and the Reserve

Overarching policy

It is the Department's policy, as mandated by the National Water Act (36:1998), to:

- Determine either numerical or narrative RQOs that reflect the desired water quality, water quantity and aquatic ecosystem quality for a chosen management class; and
- Determine a Reserve, including satisfying basic human needs and protecting aquatic ecosystems.

Integration of quantity and quality

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.

Preliminary RQOs

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 can be done at different levels of confidence.

Giving effect to RQOs through RWQOss

Once resource quality objectives have been published in the *Gazette*, or preliminary resource quality objectives have been 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 (RWQOs)" (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 that is aimed at achieving and sustaining compliance with resource quality objectives.

Catchment compatibility

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.

Interim transitional phase

In the interim transitional phase, the Department will consider using 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 that exhibit water quality stress.

Preliminary water 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).

Modification of RQOs or RWQOss

In accordance with the principle of *flexibility*, an enabling principle of *adaptive management*, RQOs or RWQOs may be revised, following *due process*, in the following circumstances:

- The baseline ecological data upon which RQOs or RWQOs have been based change because new and better data become available. In such instances, new RQOs or RWQOs may be set based on the more relevant ecological data.
- Significant changes in the catchment vision, established following *due process* and full application of the enabling principles of catchment visioning create an inconsistency with current RQOs and/or RWQOs.
- Water treatment technology improves and becomes more cost-effective, allowing changes to what is regarded as the best practicable environmental option. Applying the principle of *optimal water use*, current RQOs or RWQOs may therefore be made more stringent in favour of *protection of water resources*.
- Political decisions (*e.g.* increased emphasis on socio-economic development in selected catchments), such as those based on presidential and national imperatives.

4.9 Source directed control

4.9.1 Introduction

Relation to resource directed measures

Although at different ends of a spectrum of management focus, the Department recognises that source directed controls are driven by the resource directed measures in place, in particular the resource quality objectives. This policy therefore provides direction to 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 (107:1998).

Determining resource directed measures comprises part of the planning function within the "plan, implement, check, review" cycle. Source directed controls and monitoring comprise the "implement" function.

Co-operative governance

The Department acknowledges that source directed controls necessarily go far beyond the scope of resource directed management of water quality. It is therefore the Department's policy to apply the principles of *co-operative governance* and *general legislative alignment*.

4.9.2 Hierarchy of decision-making

Overarching policy

As an example of *principle-based decision-making*, it is the Department's policy to apply the series of principles in the priority order below (*pollution prevention*, *waste minimisation*, etc.) in the general context of integrated water quality management (van Wyk *et al.*, 2002).

The Department will generally balance the ecological necessity of applying the *precautionary 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. Even *pollution prevention* and *waste minimisation* can be regarded as an application of this principle.

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. Where a substance or effluent exhibits characteristics of toxicity, persistence and capacity for bioaccumulation or endocrine disruption, these are regarded as presenting major threats to the receiving water environment. Where these threats are involved, the differentiated approach below does not apply because of the difficulties associated with determining appropriate resource water quality objectives for these pollutants.

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 correct the problem.

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 still 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 that is 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.

Remediation

Finally, again 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 may sometimes be totally 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 of *pollution prevention, waste minimisation* and the differentiated approach with the emphasis stated above.

4.9.3 Water allocation

Emphasis on redress

Whether referring to water quantity or water quality, the Department recognises the fundamental role that application of the principle of *current equitable access*, and its enabling principles, will play in poverty eradication. Accordingly, in its quest to appropriately balance the enabling principles of *sustainable development*, it is the Department's policy to give particular emphasis to the principle of *redress* and recognise the principle of *acceptable prejudice* when considering *equitable allocation*. This will apply particularly when re-allocation of water, or water quality, requires curtailment of existing lawful uses (*e.g.* through compulsory licensing).

Public interest

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

Fraction allocated

If the resource contains some allocatable water quality, an applicant will typically not be allocated all that is available. An appropriate fraction may 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.

4.9.4 Water use

Principle-based decision-making

Acknowledging the need to make recommendations or decisions that are consistent and defensible, it is the Department's policy to apply the principles of *principle-based decision-making* in the process of evaluating and granting (or not granting) authorisations for water use.

Resource management class ('first line of defence')

On the one hand, the Department will strive to attain and maintain at least 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; and
- Adhering appropriately to uniform minimum requirements or standards.

'Second line of defence'

It is also the Department's policy not to permit deterioration of water quality that will result in an unacceptable trend that may potentially decrease its present management class.

Furthermore, in cases where the class has been designated and the existence of some allocatable water quality has been established, this will not be taken to mean *sustainable development*, and *pollution prevention* and *waste minimisation* in particular, have been adequately considered. It is the Department's policy to ensure that each water use, and the overall (possibly inter-sectoral) suite of water uses, takes appropriate account of the enabling principles of *sustainable development* in all instances, even when within the limits defined by the resource quality objectives of the designated class. This can be regarded as a 'second line of defence' against development that may potentially be unsustainable.

Economic good

The Department recognises that the allocatable water quality can be regarded as an economic good because both rivalry and excludability can apply. Rivalry exists because water users can compete for its use. Excludability exists because once a water allocation has been made to a particular user, that user can exclude use of that water by other users.

Socio-economic impact

It is the Department's policy to determine and evaluate the socio-economic impact of a proposed water use by applying the principles of *environmental integration* and *general legislative alignment* and by ensuring an appropriate level of *effective stakeholder engagement*.

The Department is committed to facilitating socio-economic development in South Africa through the principle of *optimal water use*. The implications of not granting an authorisation for a water use, and thereby possibly sacrificing *optimal water use* with potentially significant socio-economic enhancements, will be carefully considered. Previous investments by water users will also be considered. The following options may also be considered:

- Increasing the allocatable water quality of the resource within the resource water quality objectives that have been set, or
- Obtaining more accurate measurements of this.

Redress and optimal water use

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.

Authorisation period

Applying the *precautionary approach* and *adaptive management*, the authorisation period may be shortened when necessary to allow for reasonable reassessment of the conditions of the authorisation in the light of:

- Improved understanding of the natural changes in water quality when this may initially have been inadequate, or
- The future availability of improved effluent treatment technologies that may mitigate negative impacts on the resource or improve the degree of *water conservation*.

Authorisation review

As mandated by the National Water Act (36:1998), it is the Department's strict policy to review authorisations on a regular basis with the period between reviews being not more than five years.

Transparent governance

It is also the Department's policy to apply the principle of *transparent governance* to ensure that reasons for decisions can be made available by retaining a formal written record of decision. It is not the Department's policy to pursue *transparent governance* with the express purpose of enabling peer pressure on transgressors. Furthermore, the Department will not purposefully adopt the approach of "name and shame", preferring to engage with transgressors directly.

4.10 Monitoring

4.10.1 Introduction

Mandate

Within the limited scope of this policy, and specifically relating to resource water quality, the Department embraces the mandate of the National Water Act (36:1998) (Chapter 14) to provide for the collection of appropriate data and information necessary to assess:

- The quality of water resources;
- *Remediation* initiatives;
- Compliance with resource quality objectives; and
- The health of aquatic ecosystems.

Ecological integration

It is the Department's policy to ensure that monitoring of water quality:

- Contributes meaningfully to the Department's efforts to facilitate sustainable development, and
- Is explicitly linked to Resource Directed Measures, and
- 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 Africa’s water resources.

Measuring effectiveness

From the perspective of integrated water quality management, the Department regards water quality monitoring in water resources as providing the most directly relevant information for measuring the effectiveness of integrated water quality management. This occurs at different scales:

- National status and trends monitoring provides a higher-level integrated picture of the overall national effectiveness.
- Performance monitoring compares actual water resource quality with pre-determined resource management objectives (such as resource quality objectives and the Reserve), providing information at the spatial and temporal scale for which such objectives have been defined.
- Licence compliance monitoring in affected water resources provides the local site-specific information that is required to determine the effectiveness of source directed controls.

Water quality variables

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.

Beyond water quality

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

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

These, with monitoring the state (S) of water quality, comprise so-called PSIR monitoring. 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.

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 that 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.

Access to information

Applying the principle of *general legislative alignment*, and in line with, and subject to, the Access to Information Act (2:2000) and the National Water Act (36:1998), it is the Department's policy to ensure that data collected in national monitoring programmes and any other programmes for which the Department or catchment management agencies have responsibility, will be made available upon a reasonable request for access. Reasonable charges for the provision of such data may be imposed.

Data management

It is the Department's policy to ensure that data management systems are appropriately cost-effective and able to adequately meet all of the requirements of national programmes and other regional monitoring programmes.

Monitoring review

Flexibility of design and *receptiveness* to new procedures, two enabling principles of *adaptive management*, are critical to sustaining a sound focus for any monitoring and its cost-effectiveness. Although monitoring programmes should be strongly focussed on well-defined objectives, management objectives and their associated requirements will change over time. New sampling, analytical, data storage, assessment and reporting techniques might also be developed. It is therefore the Department's policy to 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.

4.10.2 National status and trends

Definition

It is the Department's policy to 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 sustained fitness for use of those water resources and the integrity of aquatic ecosystems.

National perspective

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

- Monitoring the overall national effectiveness of water quality policies and strategies that themselves are usually regionally focussed;
- *Honouring international obligations* and participation in appropriate global initiatives;
- Keeping abreast of international trends in emerging problems;
- 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 (CMAs) become operational.

Delegation to CMAs

It is the Department's policy to take primary responsibility for these national monitoring programmes. However, delegation of the responsibility for implementation and associated data management to CMA will occur as and when they are created and adequate capacity is created within these CMA. It will be regarded as important that all such monitoring undertaken by the CMA addresses the objectives of the national monitoring programme as well as their own needs, as defined in their catchment management strategy.

Data assessment

The Department encourages the production of information products for the national monitoring programmes that contain assessments and presentation of data that demonstrably achieve the objectives of the monitoring programme and that are:

- Simple and easy to understand by non-experts; and
- Accurate and unambiguous to ensure that misinterpretation is avoided.

4.10.3 Performance

Definition

Acknowledging the significant importance of ensuring that water uses are such that each water resource remains within its resource management class, it is the Department's policy to establish performance monitoring programmes that measure, assess and report on the degree of compliance with RQOs.

Monitoring design

It is the Department's policy to ensure the design for RQOs compliance monitoring is appropriately catchment-focussed. Furthermore, the design should:

- Take account of any intermediate management objectives that may exist, for example resource water quality objectives or source management objectives, and
- Be consistent with, and help implement, the catchment management strategy.

Legal defensibility

The Department recognises the fundamental legal status of RQOs. It is therefore the Department's policy to ensure that the overall process of RQOs compliance monitoring is scientific, and all individual procedures are adequately defensible by being consistently and objectively applied.

Responsibility

It is the Department's policy to delegate the management and financial responsibility for RQOs compliance monitoring to catchment management agencies.

4.10.4 Compliance

Definition

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, it is the Department's policy to ensure that water quality monitoring in affected resources is included in water use authorisations when appropriate. These will be closely aligned with RWQOs, source management objectives and RQOs. Such monitoring provides an important information base for subsequent well-focussed corrective actions in cases where non-compliance is evident.

4.10.5 Remediation

Overarching policy

It is the Department's policy to measure, assess and report on the effects of *remediation* efforts in order to provide data and information on the effectiveness of those efforts. It is the Department's policy to approach

such monitoring in three possible ways, in order of decreasing priority:

- Incorporation into performance monitoring programmes, since remediation should typically be driven by (1) inadequate compliance with RQOs or intermediate management objectives, for example, RWQOs or source management objectives, or (2) threats to such compliance.
- Incorporation into national status and trends monitoring programmes, if (1) the effects of the remediation are sufficiently relevant to the abovementioned national perspectives, and (2) the existing national monitoring designs are such that they will provide adequate information without modification.
- Design and implementation of temporary site-specific monitoring programmes tailored solely to provide data and information on the effectiveness of the remediation efforts. These should ultimately be phased out and incorporated, if necessary, into performance monitoring programmes.

4.10.6 Management performance

Good governance

It is the Department's policy to apply the principle of *good governance* and place special emphasis on the enabling principles of *accountable governance* and *transparent governance*. Accordingly, it is the Department's policy to implement appropriate in-house monitoring of management performance. This is to ensure that any deficiencies in management actions within the Department are identified and corrected as soon as possible.

Capacity creation

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

4.11 Review

Policy review

Reviewing is the last function in the "plan, implement, check, review" cycle that feeds back into the planning function (catchment assessments, catchment visioning, Resource Directed Measures, catchment management strategies, etc.)

In accordance with the principles of *adaptive management*, it is the Department's policy to periodically and in a holistic way review the appropriateness (*i.e.* 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 one or more of the above are 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.

Corrective actions

If there is any indication that creates cause for concern that objectives are not being achieved, and there is no reason to suspect that this policy or its associated strategy are inappropriate, it is the Department's policy to institute management actions that address the relevant shortcomings.

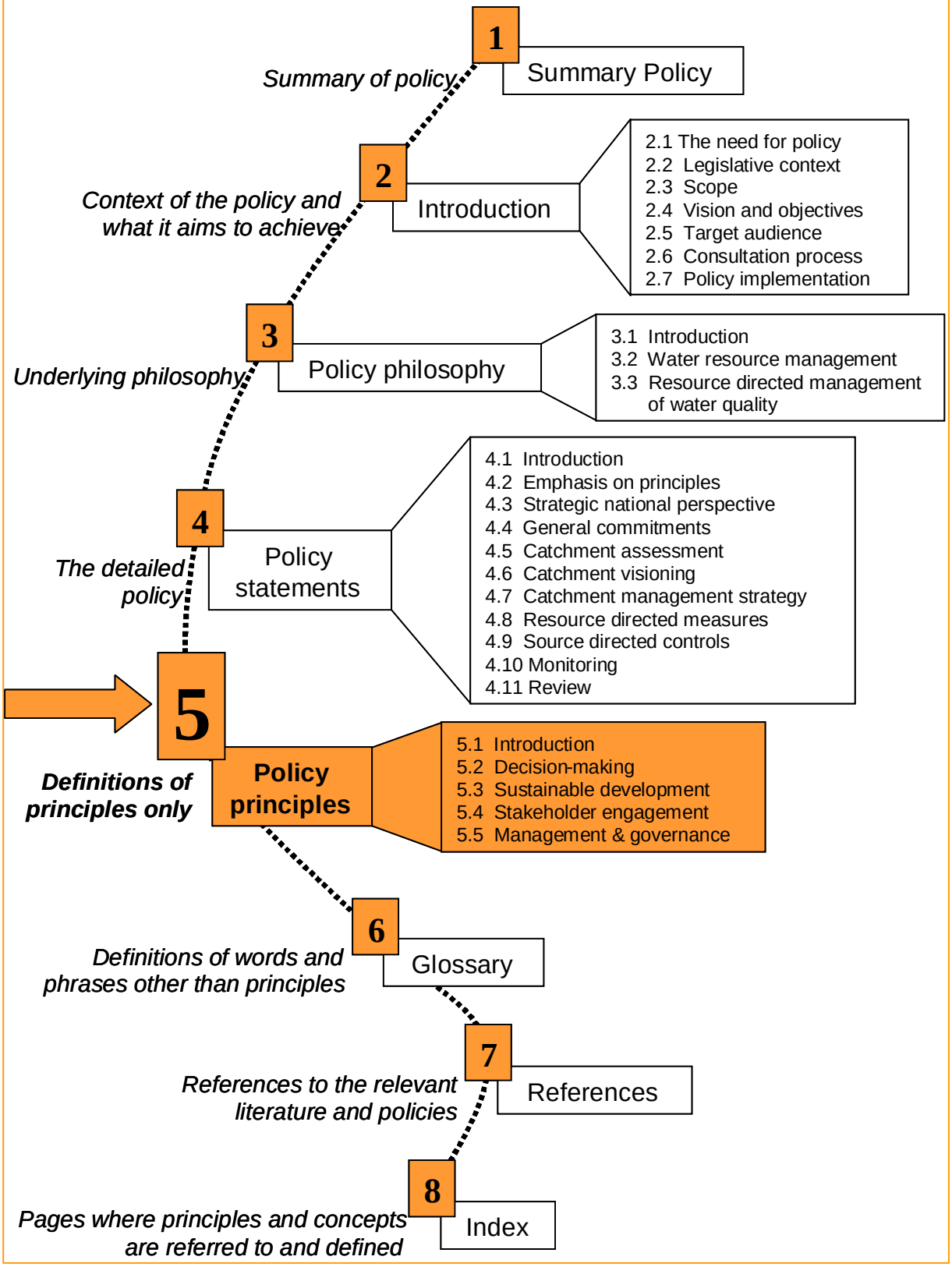
Catchment visions

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

Document roadmap



SECTION 5: POLICY PRINCIPLES

PHOTO: K MURRAY

5.1 Introduction

Thinking tools

This section formally defines all the principles referred to in previous policy statements. It also defines hierarchies of enabling principles where appropriate. These help to identify and more fully understand those principles between which some tension may exist.

The principles and hierarchies are presented as thinking tools intended to stimulate debate and a deeper common understanding. Their application will be guided by policy and the specific circumstances of individual scenarios.

Ultimate aim

The ultimate aim of such a presentation of principles is that through debate and refinement they will eventually become entrenched in the management of water resources and thereby facilitate a more structured and consistent application of legislation nationwide.

Internal consistency

The individual principles presented here may seem to differ somewhat from the way that they are presented in other documents. This is mainly to achieve internal consistency within this document. However, as a whole, the assemblage of principles presented here should not conflict with the overall general intentions of other relevant documents.

Hierarchy

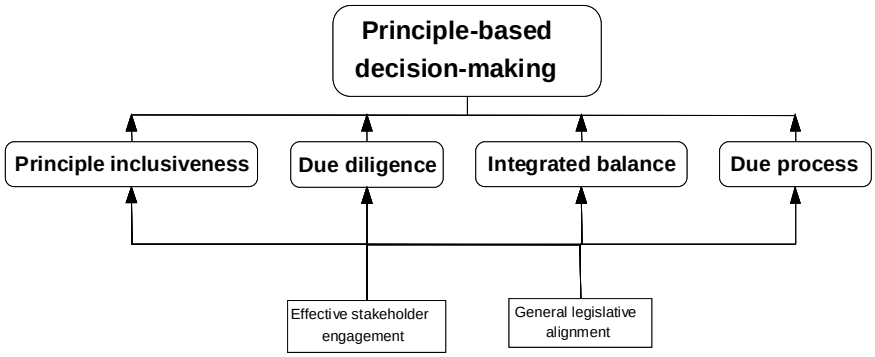
Within a given hierarchy, each level of principles 'enables' those above them. At any level in the hierarchy, 'applying a principle' means considering the principle itself and all enabling principles below it. A specific consequence of this is that if a policy statement makes reference to a principle, by implication, it also refers to all of that principle's enabling principles.

Index

Principles are identified in the policy text using italics. Because they do not appear in this section in any particular order, an index is provided at the end of this document to indicate those pages on which principle definitions occur.

5.2 Decision-making

5.2.1 Principle-based decision-making



Definition

Acknowledging the need to make decision-making more systematic and consistent, *principle-based decision-making* strives to base choices or decisions in a fair and just manner on a firm foundation of commonly understood and accepted principles (including risk-based) with a view to:

- Facilitating objective consensus seeking, as far as this is possible; and
- Ensuring the defensibility of decisions.

The following principles enable *principle-based decision-making*:

Principle inclusiveness

Acknowledging that consideration of all relevant principles is essential for defensibility, *principle inclusiveness* strives to ensure that all relevant principles are considered and this is done in line with current legislation (*e.g.* considering the legal status of the Reserve).

Due diligence

Acknowledging that adequate consideration must be afforded each relevant principle, *due diligence* ensures that each principle is afforded an appropriate degree of attention.

Integrated balance

Acknowledging that, in any given context, principles may compete and, in different contexts, they may vary in their relative importance, *integrated balance* strives to consider relevant principles in a balanced manner with a relative importance being afforded to each, appropriate to the context.

Due process

Acknowledging the importance of consistency and objectivity, *due process* strives to carry out procedures in accordance with legislation, in particular the Promotion of Administrative Justice Act (3:2000) or agreed guidelines.

The following principles are enabling principles of the above four principles:

Effective stakeholder engagement

As defined in section 5.4.1.

General legislative alignment

As defined in section 5.5.2.

5.2.2 Creative problem solving

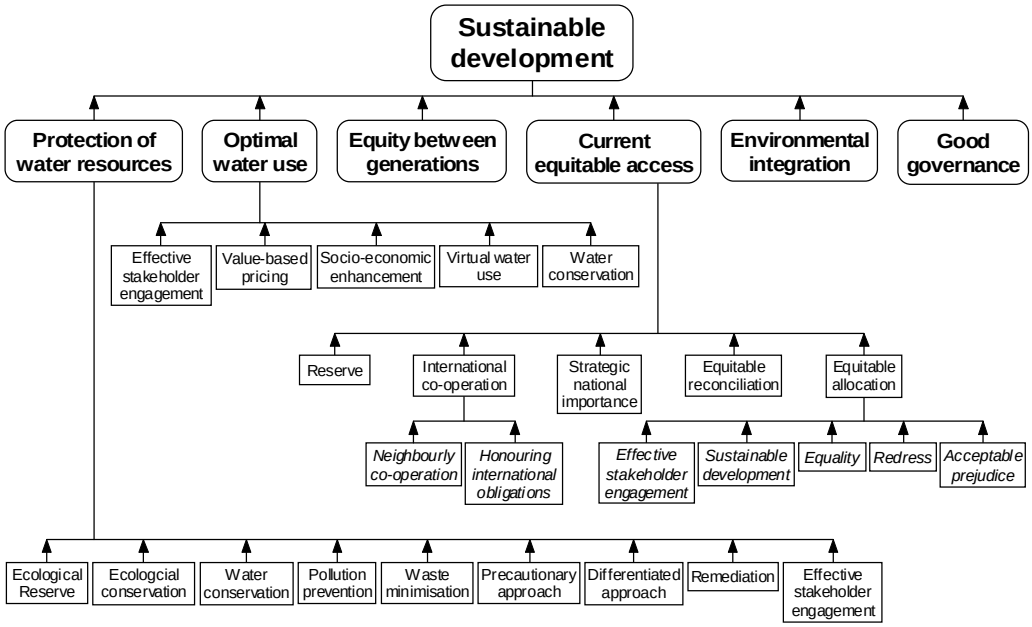
Definition

Acknowledging:

- The complex technical and social challenges facing water quality managers, and
- The need to question the use of compromise as the most immediately obvious solution to a problem,

creative problem solving strives for imaginative thinking in the search for optimum win-win solutions to problems in a technical, socio-economic and ecological sense (*e.g.* in taking account of the balance sought between protection and use).

5.3 Sustainable development



Definition

Acknowledging that:

- Ecological, socio-economic and political factors are interdependent,
- National and international stakeholders deserve just and fair access to the benefits of our shared water resources,
- Future generations have the same basic rights as ourselves,
- Growth is not possible without development,
- All life is dependent, either directly or indirectly, on the healthy functioning of aquatic ecosystems,
- Most kinds of water uses impact negatively on the health of ecosystems, and
- Demand for ecosystems services often exceeds supply and that these ecosystems are limited in their capacity to provide these services,

sustainable development 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.

Legal requirement

Sustainable development is explicitly promoted by the Constitution (108:1996), and the National Water Act (36:1998) and is given legal effect by the National Environmental Management Act (107:1998).

Classification of principles

Sustainable development is traditionally seen as requiring a balance between ecological, social and economic considerations. Figure 5.1 illustrates such a classification for the enabling principles of *sustainable development* based strictly on the definitions that follow. It simply illustrates that sometimes the lower level principles that may need to be balanced in order to achieve *sustainable development* can occur in quite different realms.

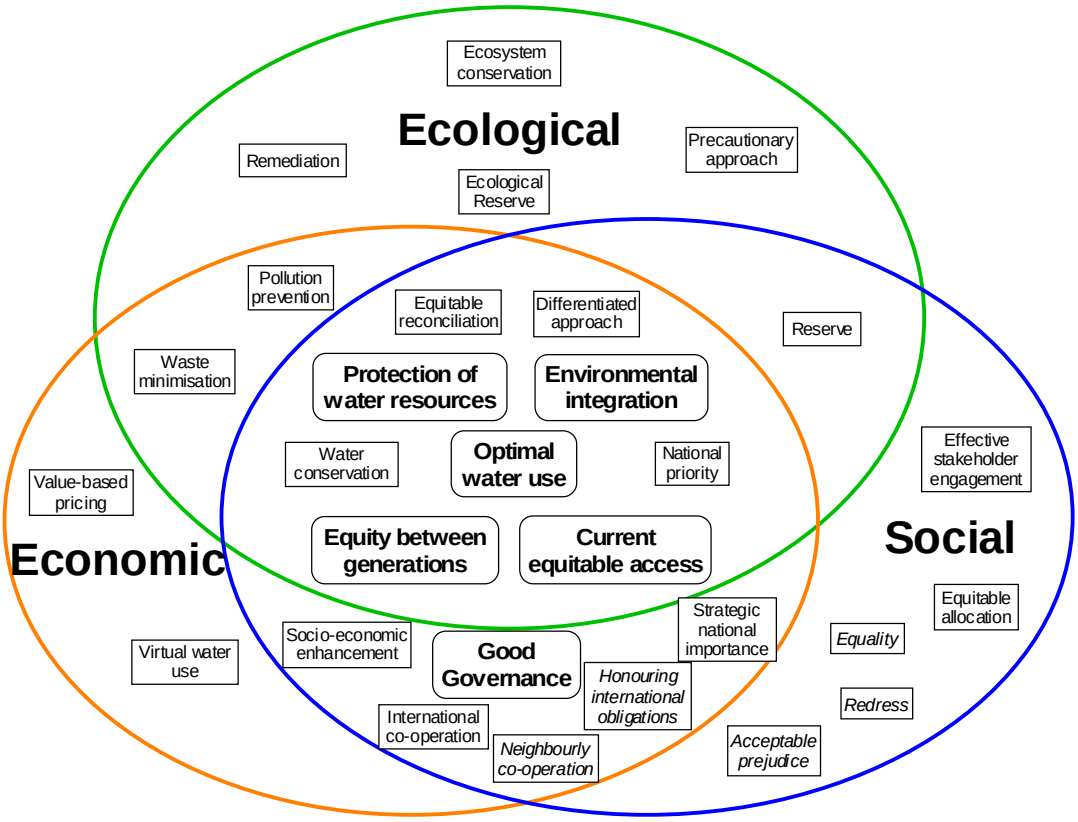


Figure 5.1: Possible classification of sustainable development principles as ecological, economic or social. (The formatting of individual principles corresponds to the hierarchy illustrated above)

5.3.1 Protection of water resources

Definition

Acknowledging that:

- All life is dependent, either directly or indirectly, on the healthy functioning of aquatic ecosystems, and
- Although many aquatic ecosystems exhibit some resilience to negative impacts, their ability to recover has limits, and
- Demand for the benefits from the associated water resources frequently exceeds supply, and that
- There is potential for water resources to be over-utilised for excessive short-term benefits that will compromise their ability to sustain the long-term provision of these benefits,

protection of water resources 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.

The following principles enable *protection of water resources*:

Ecological Reserve

Acknowledging that the health of aquatic ecosystems in a particular management class must be maintained to enable them to sustain intrinsic ecological functions, the *ecological Reserve* strives to ensure that an appropriate quantity and quality of water is reserved for the healthy functioning of aquatic ecosystems.

Ecological conservation

Acknowledging that the current generation has a moral responsibility to protect the healthy functioning of ecosystems, including their chemical, physical and biological processes, and biodiversity, *ecological conservation* strives to maintain the integrity of natural ecosystems in their own right and in particular their natural water quality because of its intrinsic value. *Ecological conservation* is explicitly promoted in the Constitution (108:1996).

Water conservation

As defined in Section 5.3.2.

Pollution prevention

("Prevention is better than cure.") Acknowledging:

- The potential for irreversible negative impacts, and
- Potentially expensive and long-term remediation during which time those water resources are unable, or have reduced capacity, to provide benefits,

pollution prevention entails avoiding:

- Degradation of water resources, and water quality in particular, in the first place, and
- Further degradation of that which may already have been impacted negatively.

Pollution prevention is explicitly promoted in the Constitution (108:1996), the National Water Act (36:1998) and the National Environmental Management Act (107:1998).

Waste minimisation

Acknowledging that degradation of water resources can often not be avoided altogether, *waste minimisation* strives to reduce waste produced as much as is economically and socially possible. Typically this involves such approaches as recycling and re-use of waste or water containing waste, waste recovery, waste treatment (such as detoxification or neutralisation) and the use of cleaner technologies and best management practices.

Precautionary approach

Acknowledging that when a lack of scientific certainty exists regarding impacts, there is a risk of unpredictable negative ecological impacts, the *precautionary approach* ensures that risk-averse and conservative decisions or actions are implemented to minimise these risks. Equivalently, this lack of certainty will not be used as a reason for postponing cost-effective measures to prevent the impacts.

Differentiated approach

Acknowledging that catchments differ fundamentally:

- In an ecological sense, and
- In the way they are used, and
- In the extent of such use,

the *differentiated approach* strives to ensure that catchment-specific conditions are taken into account in all management decisions.

Remediation

Acknowledging:

- The current degraded, and deteriorating, state of some water resources, and that
- Attempts to improve the quality of some of these water resources will require more actions than controlling current active water use,

remediation strives to intervene directly 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. (Remediation is sometimes also referred to as rehabilitation.)

Effective stakeholder engagement

As defined in section 5.4.1.

5.3.2 Optimal water use

Definition

Acknowledging that growth is not possible without development, *optimal water use* strives 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.

The best alternative use applies in two contexts:

- Each individual water use should provide for a very favourable socio-economic development and improved quality of life (*i.e.* be a beneficial use, as implied in the National Water Act (36:1998)).
- The overall portfolio of water uses should be an optimal combination of such individual uses. For example, at the highest level, a favourable balance between inter-sectoral uses should be achieved.

The following principles, when appropriately balanced, enable *optimal water use*.

Effective stakeholder engagement

As defined in section 5.4.1.

Value-based pricing

As defined in section 5.5.7.

Socio-economic enhancement

Acknowledging that:

- Social benefits (such as skills development, job creation, wealth creation and improved health levels), and
- Direct economic gains

impact positively on the general well-being and quality of life of people, leading to:

- An increased likelihood of further investment either financially or in kind, and
- Improved perceptions of the value of good water quality,

socio-economic enhancement strives to support initiatives that result in such social benefits, economic gains, poverty eradication and improved quality of life.

Virtual water use

Acknowledging that a holistic perspective of optimal water use is important, *virtual water use* strives to ensure that the costs and benefits of using alternative, even foreign, sources of water to achieve desired local socio-economic advantages are carefully considered.

For example, this includes considering importing agricultural products from other regions or even other countries where less (or no) water quality stress exists. In other words, the costs associated with importing such a product from an area under less water stress should be weighed against the costs of producing that product locally, especially when the local area is water stressed.

Water conservation

Acknowledging that water scarcity and deteriorating water quality significantly worsens the potential impacts of wasting water and water quality (*i.e.* reducing water quality for no demonstrable benefit), *water conservation* strives for efficient use and minimising such waste.

5.3.3 Equity between generations

Definition

Acknowledging that future generations have the same basic rights as ourselves to:

- Sufficient water of adequate quality; and
- Healthy ecosystems,

equity between generations promotes socio-economic enhancement that does not compromise these rights.

This principle, sometimes referred to as "inter-generational equity", underpins the Department's vision of "ensuring some, for all, forever, together".

5.3.4 Current equitable access

Definition

Acknowledging that:

- The current generation of national and international stakeholders deserve just and fair access to the benefits of our water resources, and
- A wide variety of needs and preferences exist relating to access to the goods and services of our water resources, and water quality in particular, and
- *Equity between generations* is more likely to be achieved if equitable access exists in the current generation,

current equitable access 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 enabling principles below.

This principle is sometimes referred to as "intra-generational equity".

The following principles, when appropriately balanced, enable *current equitable access*:

Reserve

Acknowledging the importance of:

- The basic human needs of all the people of South Africa, and
- The appropriate water needs of ecosystems to enable them to sustain intrinsic ecological functions,

the *Reserve* strives to ensure an appropriate quantity, quality and assurance of water for these two purposes.

The basic human needs *Reserve* is a basic right to all and, with the *ecological Reserve*, enjoys priority.

International co-operation

Acknowledging that:

- South African water resources are part of the global water cycle, and
- Our water resources cannot be managed in isolation, and that
- Two thirds of our land area lies in international catchments that are shared with our neighbours (Turton, 2003),

international co-operation promotes responsible management of our water resources in a globally sustainable and co-operative manner.

The following, potentially competing, principles enable *international co-operation*:

Neighbourly co-operation: Acknowledging that our neighbouring countries deserve fair access to the benefits of our shared water resources, *neighbourly co-operation* promotes sharing of these benefits in a spirit of mutual co-operation.

Honouring international obligations: Acknowledging our integral part in the international community, *honouring international obligations* strives to live up to and abide by formal obligations relating to our water resources on a global scale.

Strategic national priority

Acknowledging that some water needs are of fundamental importance at a national level, the meta-principle *strategic national priority* applies the following relative importance to the above principles and other priorities:

- First, the *Reserve*, then
- *Honouring international obligations*, then
- Strategic uses (such as electricity generation), then
- Strategic future growth (in special circumstances), then
- Inter-basin transfers.

Equitable reconciliation

Acknowledging the Department's commitment to holistic and integrated water resource management, *equitable reconciliation* strives to find an 'equitable balance' between the water quality that can reasonably be supplied with the water quality requirements of all water users. This will be done in a way that is just and fair in the sense of being based on laws and accepted principles.

Equitable allocation

Acknowledging:

- The severity of the inequalities of the past in South Africa, and that
- The remaining allocatable resource, relating to water quality in particular, (*i.e.* remaining after the strategic national priorities have been addressed) can be regarded as an economic good, and that
- Flexibility in the level of protection is provided by the management class,

equitable allocation strives to ensure that decisions regarding the allocation (or non-allocation) of that remaining resource are just and fair by being soundly based on the following enabling principles.

Effective stakeholder engagement: As defined in section 5.4.1.

Sustainable development: As defined in section 5.3. The iterative nature of *equitable allocation* of resources and *sustainable development* itself is inevitable. The allocation of a portion of a resource (that is regarded as an economic good) to current water users may threaten *sustainable development* directly by challenging the principle of *protection of water resources*. Therefore *equitable allocation* is an enabling principle of *sustainable development*.

However, to minimise this threat:

- In the absence of a formal resource classification the enabling principles of *sustainable development*, and their relative importance, must be extremely carefully considered for every allocation decision. This is because the 'first line of defence' (*i.e.* the formal classification) does not yet exist. In this scenario, *sustainable development* can be directly threatened by an inappropriate allocation decision.

- When a formal resource classification is available, and hence a 'first line of defence' exists for *sustainable development*, the enabling principles of *sustainable development* remain the most appropriate criteria upon which to base allocation decisions. In effect, this provides a 'second line of defence' for *sustainable development*, *i.e.* at a finer resolution.

Therefore, *sustainable development* must be an enabling principle of *equitable allocation* in both these scenarios.

Equality: Acknowledging that everyone is constitutionally entitled to the full and equal enjoyment of all rights and freedoms, *equality* strives for non-discrimination on the basis of race, gender, sex, pregnancy, marital status, ethnic or social origin, colour, sexual orientation, age, disability, religion, conscience, belief, culture, language or country of birth.

Redress: Acknowledging:

- The severity of past inequalities in South Africa, and
- The need to fast-track achievement of equality,

redress justly promotes preferential consideration being given to persons that were subject to such past discriminatory practices.

Note that, by this definition, *redress* contradicts the principle of *equality*. Nevertheless, *redress* is regarded as a temporary principle that is relevant at this point in our history, since it is aimed ultimately at fast-tracking the achievement of *equality*. It might also be noted that *redress* is constitutional (Section 9(2)).

Acceptable prejudice: Acknowledging that in some cases allocations involve inevitable negative impacts on some stakeholders or aquatic ecosystems, *acceptable prejudice* accepts these allocations if the impacts are such that they are not significantly detrimental to those stakeholders or aquatic ecosystems.

5.3.5 Environmental integration

Definition

Acknowledging that:

- All physical, chemical and biological components, particularly including those comprising water quality, and the processes within natural water resources directly or indirectly affect, or are affected by, ecological, social and economic factors, and
- The effects of, or on, ecological, social and economic factors can be either harmful or beneficial and these effects can be expressed in either monetary or non-monetary terms,

environmental integration holistically considers all important interactions with, and within, ecosystems and water quality in particular.

Environmental integration also includes the consideration of:

- Public, scientific and technical issues, and
- All possible options related to an envisaged development.

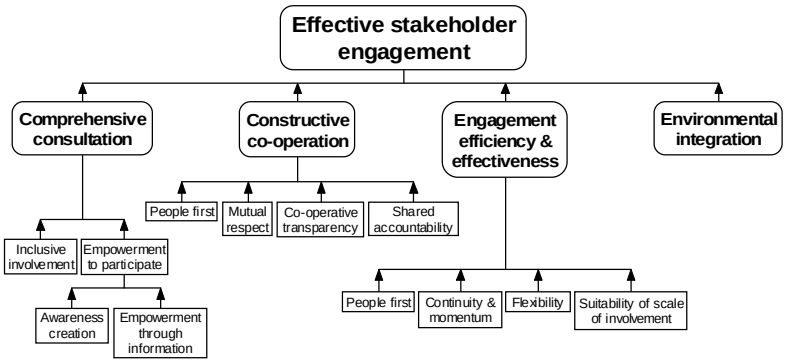
5.3.6 Good governance

Definition

As defined in Section 5.5.5.

5.4 Stakeholder engagement

5.4.1 Effective stakeholder engagement



Definition

Acknowledging that decisions relating to water quality allocation should be made "in the public interest", *effective stakeholder engagement* strives for ongoing mutually beneficial interaction between all stakeholders or their representatives. It aims to create an enabling environment for their meaningful and constructive engagement during all stages of projects and processes. It is done specifically so that the decision-maker can make a decision that considers the needs and preferences of all stakeholders.

Stakeholders vs. role players

A distinction is made between stakeholders and role players in this process. 'Stakeholders' are those who have a direct interest in or directly affect, or are affected by, water resources in general and water quality in particular (often referred to as "Interested and Affected Parties"). 'Role players' may include the stakeholders, government departments (often the decision-maker), stakeholder engagement facilitators and technical specialists.

The definition and interpretation of this principle and the enabling principles that follow are based largely on DWAF (2001) and van Wilgen *et al.,* (2003). The term 'stakeholders' should be assumed to mean 'stakeholders or their representatives'.

Comprehensive consultation

Acknowledging that:

- Water quality management in a complex socio-economic and political setting requires co-operation between the various resource users; and
- All stakeholders must be included if the consultative process is to be socially and politically sound and legitimate,

comprehensive consultation endeavours to establish what is "in the public interest" by:

- Engaging and consulting all stakeholders, and
- Empowering them to make informed choices,

thus enabling them to articulate their needs and preferences in a meaningful and constructive manner.

The following principles enable *comprehensive consultation*:

Inclusive involvement: Acknowledging that co-operation between all stakeholders is essential, *inclusive involvement* aims to engage all stakeholders in a manner that ensures that all views are given due consideration and that no person is marginalised.

Empowerment to participate: Acknowledging:

- The importance of inclusive involvement, and that
- Confident and empowered stakeholders contribute more effectively,

empowerment to participate strives to ensure that all stakeholders have the capacity to contribute meaningfully.

Empowerment through information: Acknowledging that empowerment of stakeholders is essential, *empowerment through information* promotes the timely provision of appropriate information to stakeholders in an accessible language and terminology.

Awareness creation: Acknowledging the importance of:

- Empowering stakeholders, and
- Creating trust and co-operation among all stakeholders,

awareness creation strives to make stakeholders aware of all relevant issues in a clear and truthful manner.

Constructive co-operation

Acknowledging that a positive approach to facing and dealing with issues with confidence is vastly preferable to conflict, *constructive co-operation* strives for a combined effort by all role payers that is positively productive.

The following principles enable *constructive co-operation:*

People first ("*Batho pele*"): Acknowledging the need for the facilitator to set an impeccable example in service delivery, applying the principles of *people first* (as defined in section 5.4.2) encourages other role players to behave with similar integrity.

Mutual respect: Acknowledging the positive reciprocal effects of respect for others, *mutual respect* strives for each role player to acknowledge and respect the knowledge (in all its forms), wisdom, culture, language, abilities, concerns and inputs of other role players.

Co-operative transparency: Acknowledging the importance of honesty and openness in creating trust among all stakeholders, *co-operative transparency* promotes forthright discussion with no "hidden agendas".

Shared accountability: Acknowledging the need for all role players to accept their due responsibility, *shared accountability* between role players promotes an acceptance of the need for acknowledging and sharing their respective commitments, costs and benefits of stakeholder engagement as well as a shared accountability for the successes and failures of the process. This is particularly relevant to the decision-maker who must consider all stakeholder needs and preferences and then make a decision, even if there is not complete consensus.

Engagement efficiency and effectiveness

Acknowledging that the capacity and resources of all role players are valuable and often limited, *engagement efficiency and effectiveness* promotes the focussed use of these resources while respecting the individual efforts and contributions of role players.

The following principles enable *engagement efficiency and effectiveness*:

People first ("*Batho pele*"): Acknowledging the need for the facilitator to set an impeccable example in service delivery, applying the principles of *people first* (as defined in section 5.4.2) encourages other role players to behave with similar efficiency and effectiveness.

Continuity and momentum: Acknowledging the importance of:

- Keeping all role players focussed, and
- Maintaining a clear goal-driven process,

continuity and momentum of the process ensures that:

(1) all role players

- Are involved continuously throughout the process,
- Receive ongoing feedback and have many opportunities for comment,
- Exchange information and share and evaluate ideas, and that

(2) monitoring and evaluation of progress occurs.

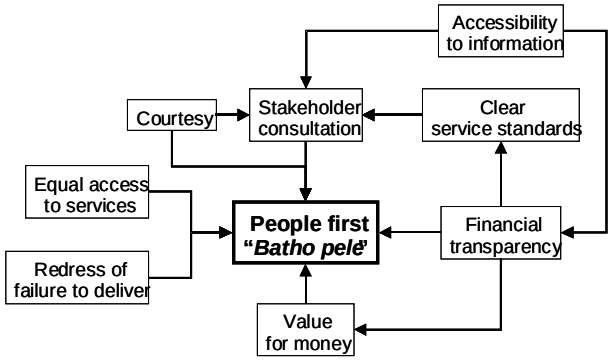
Flexibility: As defined for the adaptive management process (section 5.5.1).

Suitability of scale of involvement: Acknowledging the need for cost-effectiveness, *suitability of scale of involvement* ensures that financial and other resources committed to the process are in proportion to the potential impacts and possible interest.

Environmental integration

As defined for *sustainable development* (see section 5.3.5).

5.4.2 People first ("Batho pele")



Definition

Acknowledging that all stakeholders have a right to efficient and cost-effective service delivery, *people first* adheres to a service delivery code of practice that places a high priority on meeting the needs and preferences of stakeholders.

Source of principles

The following enabling principles are marginally adapted from those published by the Department of Public Services and Administration (www.dpsa.gov.za). As originally described, they apply specifically to service delivery by Government departments to the people of South Africa. The interpretation adopted here is that the enabling principles are applicable in any situation in which a service is being delivered. Accordingly, for example, "citizen" is replaced with "stakeholder" and "public service" is replaced with "service". *People first* amounts to a service delivery code of conduct and practice by people to people. Examples of such services include the following:

- Those offered by the facilitator of a stakeholder engagement process; or
- The services offered directly by a DWAF official or directorate or catchment management agency official to an applicant applying for a water use licence.

As defined here, service delivery does not apply to those goods and services supplied by a water resource. The service is supplied by a person or organisation.

The following principles enable *people first*:

Stakeholder consultation

Acknowledging that services must be focussed and effective, *stakeholder consultation* endeavours to establish directly from stakeholders the level and quality of services they want.

Clear service standards

Acknowledging the need for effective consultation, publishing *clear service standards*, including continual improvement and the associated monitoring informs stakeholders on what they can reasonably expect to receive.

Equal access to services

Acknowledging the need for *equality* among all stakeholders particularly physically, socially, economically and culturally disadvantaged persons, *equal access to services* strives to provide all stakeholders with equivalent access to the services to which they are entitled.

Courtesy

Acknowledging the need for effective consultation and ultimate service delivery, *courtesy* promotes politeness and consideration in all dealings with stakeholders.

Accessibility to information

Acknowledging the need for openness, transparency and efficient and effective consultation, *accessibility to information* involves facilitating the availability of complete, accurate and timely information on:

- The services stakeholders are entitled to receive and
- On the management process that will be followed.

Financial transparency

As defined for sound financial management (section 5.5.3).

Redress of failure to deliver

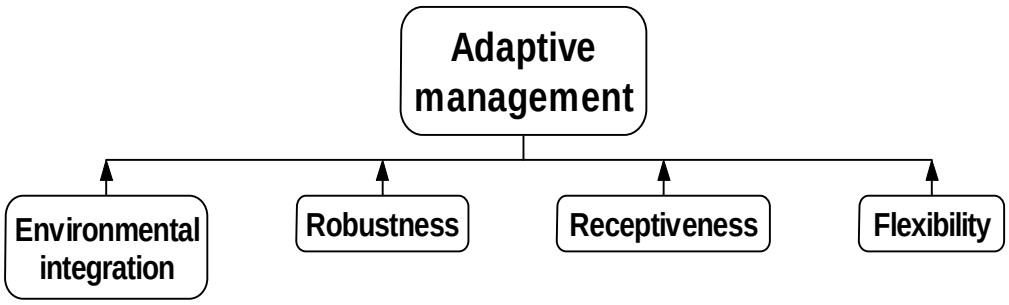
Acknowledging the need for efficient and effective service delivery, *redress or failure to deliver* promotes remedying problems efficiently and effectively.

Value for money

Acknowledging the right that stakeholders have to expect efficient and effective expenditure, *value for money* focuses on ensuring that capacity and resources are used wisely.

5.5 Management and governance

5.5.1 Adaptive management



Definition

Acknowledging that:

- Management of water resources is complex and multi-disciplinary, and
- Decisions need to be made in situations where there is frequently insufficient or uncertain data and information, and that
- Water resources are (1) in a state of continuous change and (2) are subject to unpredictable changes,

adaptive management strives for continuous management improvement in a dynamic yet systematic manner by balancing robustness with a flexibility that allows for change when circumstances may demand this.

Plan, implement, check & review

The dynamic cyclical process of "plan, implement, check, review" is an example of a system to which adaptive management is eminently applicable.

The following principles enable *adaptive management*:

Environmental integration

As defined in section 5.3.5.

Robustness

Acknowledging the need for any process to be perceived as consistent, *robustness* specifically strives for fundamental approaches that are soundly based, systematic and undeviating in their core objectives.

Receptiveness

Acknowledging that, in complex or uncertain situations, dynamic management (not complacency) is essential, *receptiveness* promotes:

- An open-minded consideration of new ideas (a 'push to change'), and
- Alertness to changes within a water resource that may signal the necessity for new approaches (a 'pull to change') to be developed and applied.

Flexibility

Acknowledging that:

- In complex situations, initial approaches may not be perfect, and
- Water resources change in predictable and unpredictable ways,

flexibility enables acceptance and the ability to adopt new and better ideas, or simply different management approaches that allow adaptation to changing circumstances when necessary.

5.5.2 General legislative alignment

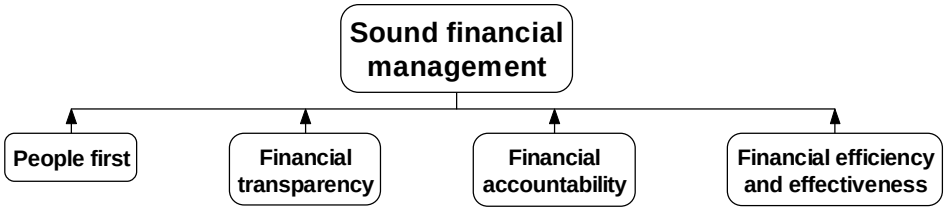
Definition

Acknowledging the presence and importance of legislation other than that of most immediate relevance, namely the National Water Act (36:1998), *general legislative alignment* strives to ensure that actions and decisions taken in accordance with the National Water Act support, or at least do not conflict with, other legislation. Such legislation may vary from Acts to ordinances, bylaws and other local regulations.

The following principle enables *general legislative alignment*:

Co-operative governance: As defined in section 5.5.5.

5.5.3 Sound financial management



Definition

Acknowledging the rightful expectations of financial contributors, such as tax payers, to achieving maximum benefits for the original purpose for which their contributions were intended, *sound financial management* strives for ethically correct and effective administration and control of all revenue, expenditure, assets and liabilities.

The following principles enable *sound financial management*:

People first ("*Batho pele*"): As defined in section 5.4.2.

Financial transparency Acknowledging the importance of honesty and openness, *financial transparency* promotes financial procedures that can be confidently confirmed as sound by independent auditors.

Financial accountability Acknowledging the importance of a sense of responsibility, *financial accountability* strives to encourage all financial officers to take full responsibility and accountability for their financial decisions.

Financial efficiency and effectiveness Acknowledging that financial resources are frequently the most important factor limiting growth and development and hence that 'every Rand counts', *financial efficiency and effectiveness* strives to ensure that such resources are used to achieve the best *value for money*. Efficient administration is specifically promoted by the Promotion of Administrative Justice Act (3:2000).

5.5.4 Prudent pragmatism

Definition

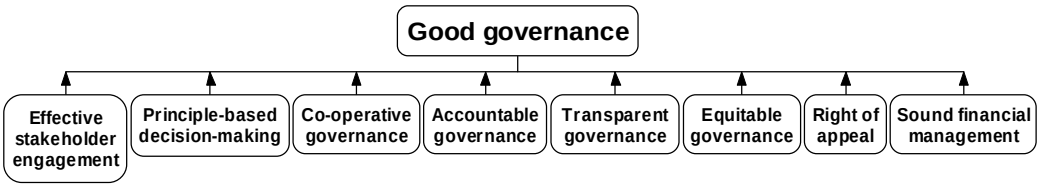
Acknowledging that:

- Implementation of many aspects of the National Water Act (36:1998) is time-consuming and expensive, and
- On-going water management and use is essential to growth and development, and
- Procrastination can have lasting significant negative impacts on *socio-economic enhancement*,

prudent pragmatism strives to apply with caution more practical (*i.e.* simpler and faster) methods as a basis for decision-making when appropriate.

The following principle enables *prudent pragmatism*:

Precautionary approach: As defined in section 5.3.1.



5.5.5 Good governance

Definition

Acknowledging the importance of integrity at all levels of management, *good governance* strives to ensure that all stakeholders:

- Manage their affairs with integrity and in a lawful manner, and
- Apply accepted principles and procedures.

Good governance is specifically promoted by the Promotion of Administrative Justice Act (3:2000).

The following principles enable *good governance*:

Effective stakeholder engagement

As defined in section 5.4.1.

Principle-based decision-making

As defined in section 5.2.1.

Co-operative governance

Acknowledging:

- The complexity of water resource management in South Africa, and that
- Many government organisations have related and even overlapping responsibilities for such management, and that
- Alignment with a common goal is essential to ultimate successful management,

co-operative governance strives to ensure that organs of state and spheres of government manage related affairs in a collectively constructive and co-operative manner.

Accountable governance

Acknowledging the need for all role players to accept their due responsibility, *accountable governance* strives to create an ethic of taking full responsibility for actions, particularly in accordance with the Promotion of Administrative Justice Act (3:2000) and Promotion of Access to Information Act (2:2000).

Transparent governance

Acknowledging the importance of honesty and openness, *transparent governance* promotes:

- Application of procedures that are open to scrutiny, and
- Keeping an adequate 'record of decision' giving reasons for the decision that can be made available in accordance with the Promotion of Administrative Justice Act (3:2000) and Promotion of Access to Information Act (2:2000).

Equitable governance

Acknowledging the importance of being just and fair, *equitable governance* strives to ensure that governance is based on accepted procedures and principles.

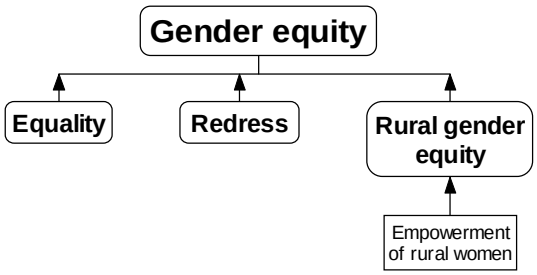
Right of appeal

Acknowledging the importance of an independent judicial system, *right of appeal* strives to ensure that an appropriate system is in place that enables appeals to be heard against decisions made by the Department.

Sound financial management

As defined in section 5.5.3.

5.5.6 Gender equity



Definition

Acknowledging:

- The severity of the inequalities of the past in South Africa, and specifically,
- The degree of discrimination against women in the past, and
- The unique role played by rural women, in particular, in local water affairs,

gender equity strives to ensure that women are afforded their rightful place in water, and water quality, management at all levels.

Social construct

It is recognised that gender is a social construct defining relations, including power relations, which define social function on the basis of sex (Schreiner, 2001).

The following principles enable *gender equity*:

Equality

As defined for *equitable allocation* (section 5.3.4)

Redress

As defined for equitable allocation (section 5.3.4)

Rural gender equity

Acknowledging:

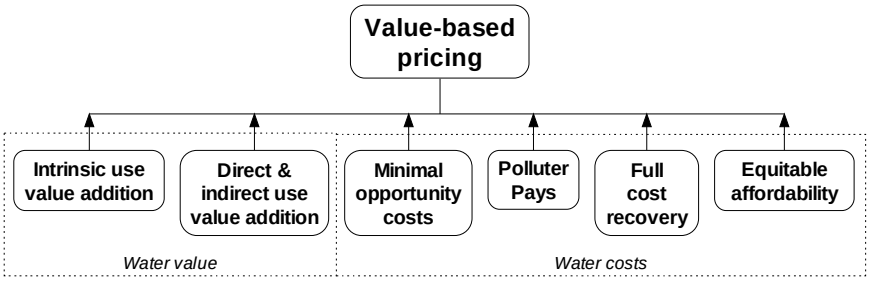
- The logistical and physical difficulties often associated with water collection and transport in rural communities, and
- The traditional responsibility of women to perform these tasks, and
- The traditional responsibility of women relating to provision of health care to their families, and
- The significance of these responsibilities, and
- The importance of local culture relating to gender issues,

rural gender equity strives to ensure that women in rural communities are afforded their rightful place in local water quality management.

The following principle enables *rural gender equity*:

Empowerment of rural women: Acknowledging that the nature of their responsibilities relating to the provision of water and health care to their families makes rural women natural primary stakeholders in local water quality management, *empowerment of rural women* strives to empower such women to contribute meaningfully to local water quality management to a degree that is commensurate with this responsibility.

5.5.7 Value-based pricing



Definition

Acknowledging that if water prices reflect the true value of water, it will be used more efficiently, *value-based pricing* strives to price water in a manner that reflects its true economic value, *i.e.* financial, social and ecological.

The following principles enable *value-based pricing* (King, 2003):

Intrinsic use value addition

Acknowledging that water can have a spiritual value, *intrinsic use value addition* strives to ensure that the contribution that water makes to our spiritual well-being is considered.

Direct & indirect use value addition

Acknowledging that the material use of water can add to its value, *direct & indirect use value addition* strives to ensure that the contribution that water makes to the net benefits of either productivity or income generation (financial and social-economic) through direct and indirect use is considered.

Minimal opportunity costs

Acknowledging that individual water uses should be considered holistically, *minimal opportunity costs* strives to ensure that the costs (financial, socio-economic and ecological) associated with the opportunity that may be lost by allocating water quality to a particular user over another are minimised.

Polluter pays

Acknowledging that polluters should not impact on ecosystem health, or lead to costs for other water users as a result of their pollution, *polluter pays* strives for "internalisation of externalities" (see glossary) to ensure that those responsible for ecological degradation are accountable for costs, in proportion to the impact caused, relating to:

- *Remediation*,
- Preventative measures to reduce or prevent further degradation,
- Production losses by others, and
- Human health impacts.

Full cost recovery

Acknowledging the basic importance of sustainable financial viability, *full cost recovery* strives to ensure that the financial costs (capital, operation and maintenance) incurred in the supply of water, and water quality in particular, are fully recovered.

Equitable affordability

Acknowledging the importance of a "level playing field", *equitable affordability* strives to minimise unfair competition for the productive use of water, and water quality, for socio-economic development.

The following principles enable *equitable affordability*:

Equality: As defined in section 5.3.4.

Redress: As defined in section 5.3.4.

SECTION 6: GLOSSARY

Allocatable water quality. 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). If the present value is already at or outside the pre-determined range, this indicates that none is allocatable and that (a) reduced pollution loads relating to the affected attribute(s) and/or (b) remediation of the resource may be necessary.

Best practicable environmental option. Defined by the National Environmental Management Act (107:1998) as 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.

Decision-making. An intellectual activity comprising the making of a rational choice between alternatives.

Degradation. Reduction in quality.

Equality. As defined in Section 9 of the Constitution, equality implies that decisions regarding water resources may not discriminate on the basis of race, gender, sex, pregnancy, marital status, ethnic or social origin, colour, sexual orientation, age, disability, religion, conscience, belief, culture, language or country of birth.

Equitable. Fair and just in the sense of being based on laws and accepted principles.

Equity. The quality of being equitable.

Fitness for use. A scientific judgement, involving objective evaluation of available evidence, of how suitable the quality of water is for its intended use or for protecting the health of aquatic ecosystems.

Internalisation of externalities. Externalities, also called external costs, spill-overs or social costs, are costs generated by a producer but paid for by someone else. A typical example is a water user that discharges polluted water into a stream. The downstream user may then need to treat the water before it can be used. This treatment in effect means that the downstream user is paying part of the production costs of the upstream user. Internalising these externalities means the polluter should be responsible for these costs. (Adapted from www.csir.co.za/era/policy/Ap_inte.html.)

Management instruments. Detailed procedures and guidelines that enable the strategy to be implemented.

Meta-principle. A principle providing guidance on the relative importance of principles.

Minimum requirements. A regulation or standard set by the Department that specifies the very least that should be complied with.

Monitoring. The measurement, assessment and reporting of selected properties of water resources in a manner that is focussed on well-defined objectives. These monitoring objectives should also be clearly linked to water resource management objectives.

Monitoring design. The definition of all aspects necessary for successful implementation of a monitoring programme. These include the monitoring variables, sampling site selection, sampling methods, sampling frequency, analytical procedures, data assessment, reporting formats, etc.

Policy. Guidance for decision-making and action that helps to set priorities and hence allocate human and financial resources.

Pollution. Defined by the National Water Act as the direct or indirect alteration of the physical, chemical or biological properties of a water resource so as to make it:

1. Less fit for any optimal water use for which it may reasonably be expected to be used, or
2. Harmful or potentially harmful to (a) the welfare, health or safety of human beings, (b) any aquatic or non-aquatic organisms, (c) the resource quality or (d) to property.

Preliminary classification. An interim classification of a water resource established in the absence of the formal classification system required by Section 12 of the National Water Act. A preliminary classification is permitted in terms of Section 14.

Preliminary resource quality objectives. An interim resource quality objective established in the absence of the formal classification system required by Section 12 of the National Water Act. Preliminary resources quality objectives are permitted in terms of Section 14.

Principle. A statement providing guidance on what should be strived for, typically acknowledging an underlying values-based assumption.

Quality of life. Physical, psychological, social, cultural, religious and material wellbeing.

Redress. To put right by compensation. In the current context, to redress is to explicitly favour persons that were subject to past discriminatory practices. It contradicts explicitly the principle of equality. It is, nevertheless, constitutional (Section 9(2)).

Reserve. Defined by the National Water Act as the quantity and quality of water required:

1. To satisfy basic human needs by securing a basic water supply, as prescribed under the Water Services Act (108:1997), for people who are now or who will in the reasonably near future, be (a) relying upon, (b) taking water from or (c) being supplied from, the relevant water source; and
2. To protect aquatic ecosystems in order to secure ecologically sustainable development and use of the relevant water resource.

Since the Reserve is a legally binding quantity, it is typically not subject to rivalry. However, its very nature creates excludability since water uses not encompassed by basic human needs and maintaining aquatic ecosystem health are explicitly excluded. Therefore, the Reserve is strictly a quasi-public good.

Resource quality. Includes all aspects of water quantity, water quality and aquatic ecosystem quality, the latter including the quality of in-stream and riparian habitats and aquatic biota.

Resource quality objectives (RQOs). Numeric or descriptive (narrative) goals for resource quality within which a water resource must be managed. These are given legal status by being published in a *Government Gazette*.

Resource water quality objectives (RWQOs). Numeric or descriptive (narrative) in-stream (or in-aquifer) water quality objectives typically set a finer resolution (spatial or temporal) than RQOs that provide greater detail upon which to base management of water quality

Source Management Objectives. Objectives relating to (a) incremental reduction, (b) maintenance or, under special circumstances, (c) incremental increase in waste loads, calculated to give effect to resource water quality objectives. They refer to the water resource management unit as a whole, not to specific water users, though they do consider technical, economic and administrative realities.

Stakeholder. An individual, group or organisation that has an interest in, or is affected by, an initiative and who may therefore affect the outcome of an initiative.

Strategic use. A water use (such as electricity generation) of strategic national importance as defined in the National Water Resource Strategy or designated as such by the Minister.

Strategy. Broad course of action focussed on the implementation of a policy.

Stress, water quality. A state in which the water quality is inadequate for the desired or designated water use. For many uses, water quality stress exists when there is no allocatable water quality.

Stressed water resource. A water resource for which the demand for benefits exceeds the supply. This can apply to either the quantity of water or the allocatable water quality.

Vulnerability: Susceptibility to harm.

Waste. Defined by the National Water Act as including any solid material or material that is suspended, dissolved or transported in water (including sediment) and which is spilled or deposited on land or into a water resource in such volume, composition or manner as to cause, or to be reasonably likely to cause, the water resource to be polluted.

Water allocation. The apportionment of water or allocatable water quality among water users.

Watercourse. Defined by the National Water Act as a river or spring, a natural channel in which water flows regularly or intermittently, a wetland, lake or dam into which, or from which, water flows and any collection of water that the Minister may declare to be a watercourse. Furthermore, reference to a watercourse includes, where relevant, its bed and banks.

Water Management Institution. Defined by the National Water Act as a catchment management agency, a water user association, a body responsible for international water management or any person who fulfils the functions of a water management institution in terms of the Act.

Water quality. The physical, chemical, radiological, toxicological, biological and aesthetic properties of water that (1) determine its fitness for use or (2) that are necessary for protecting the health of aquatic ecosystems. Water quality is therefore reflected in (a) concentrations of substances (either dissolved or suspended), (b) physico-chemical attributes (*e.g.* temperature), (c) levels of radioactivity and (d) biological responses to those concentrations, physico-chemical attributes or radioactivity.

Water resource. Defined by the National Water Act as including a watercourse, surface water, estuary or aquifer.

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SECTION 8: INDEX

Principles in *italics*; Definitions on **bold** pages.

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