Report Number 3.1 Edition 1

STRATEGY

Water Quality Management Policies and Strategies for South Africa

Integrated Water Quality Management Strategy

water & sanitation
Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

Department of Water and Sanitation

WATER QUALITY MANAGEMENT POLICIES AND STRATEGIES FOR SOUTH AFRICA

INTEGRATED WATER QUALITY MANAGEMENT STRATEGY

Report Number 3.1

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EXECUTIVE SUMMARY

Introduction

South Africa faces a wide range of water quality challenges impacting on both surface water and groundwater, originating from both point source discharges such as industrial processes and municipal WWTW, and from diffuse sources due to run-off from land. The pollution challenges manifest at various scales, differ between catchments, and have are different severity of impact. In addition, increasing demands for limited water supplies, deteriorating raw water quality and changes in temperature and rainfall due to climate change all contribute to a situation where, if not addressed urgently, will realise significant impacts upon the country's socio-economic growth.

The Imperative to Act

Despite considerable attention being paid by government to water quality management over the years, the current state of the country's water resources indicates that the management of water quality has not been as effective as required to ensure that water resources are sustainably used. This is due to a number of complex and inter-connected challenges such as balancing of socio-economic development needs, on-going uncertainties in governance, challenges with appropriate technical capacity and impacts of global shocks like climate change and disasters.

Water is a key part of the development of all sectors and as such water quality is an important dimension of ensuring that water resources do not constrain the developmental agenda.

Broadly, the challenges can be split into 4 categories: (i) Non-aligned policy, legislative and governance frameworks, (ii) Inappropriate practices, (iii) Insufficient finances and (iv) ineffective knowledge and information management.

The necessary tools and knowledge to affect significant change exists and are sufficient to turn the situation around. The challenge lies in co-ordinated and effective action from government, civil society and the private sector.

This strategy, therefore, forms a call to action for government, civil society and the private sector, to change the way that water quality challenges are addressed, and to bring about a measurable improvement in the quality of raw water across the country.

Strategic Approaches

Core strategic approaches identified include the following.

- The strategy is aligned with the strategic objectives of the policy, while being consistent with broader water and development strategies (NDP, NWRS-2);
- The strategy focuses on a short to medium timeframe, while building a platform for future strategies in line with the policy and visions for water quality management;
- The strategy should prioritize a limited number of critical concerns, while ensuring that other issues are addressed through on-going management or monitoring for future prioritisation;

- The strategy should be relevant at national, catchment and local scales, while ensuring horizontal alignment across sectors and institutions at each scale;
- The strategy should provide the strategic intent and framework for actions to be described in the implementation plans; and
- The strategy should allow for adaptive response to changing circumstances and achievements based on effective on-going monitoring and evaluation, during its timeframe.

Strategic Response

To effectively address the management of water quality in support of the NDP and the NWRS, there is a real need to elevate water quality management and to clarify the instruments that will need to be used within the DWS and across sectors in an aligned, integrated and cooperative and manner. The vision for water quality management in South Africa is to adopt:

"Government, in partnership with private sector and civil society secure good water quality for all forever"

This is given effect through a mission that is constructed from five key points.

i. Support a consistent inter-departmental approach to how water quality is managed in the country.
ii. Support cooperative and integrated approaches to water quality management across sectors, including civil society.
iii. Adopt an adaptive management approach in which co-creation and co-learning by key players is entrenched.
iv. Realise improvements in water quality in key systems.
v. Start to build capacity for longer-term improvement in water quality

In order to achieve these, five goals underpinned by key Strategic Issues have been identified and represent the core of the strategy.

- **Goal 1: Aligned Policy, Strategy and Legislation**
    - Strategic Issue 1: Harmonise Policies and Strategies to Enable Improved WQM
    - Strategic Issue 2: Legislative Review and Amendments
- **Goal 2: Improved Governance**
    - Strategic Issue 3: Improve WQM Institutional Structuring

- Strategic Issue 4: Formalise Governance Framework to Support Non-Governmental Engagements

- **Goal 3: Improved, Efficient and Effective WQM Practice**
  - Strategic Issue 5: Improve Coordination in Integrated Planning
  - Strategic Issue 6: Strengthen IWQM Regulation, Compliance and Enforcement
  - Strategic Issue 7: Application of Adaptive Management Approaches
- **Goal 4: Innovative Finance**
  - Strategic Issue 8: Improve and Sustain Fiscal Support for IWQM
  - Strategic Issue 9: Develop Pricing and Incentive Mechanisms that Support IWQM
- **Goal 5: Improved Knowledge and Information Management**
  - Strategic Issue 10: Strengthen Monitoring Networks and Information Management
  - Strategic Issue 11: Build WQ and WQM Capacity through Education, Training and Communications

Key strategic actions have been identified for these.

Towards Implementation

The strategic approach is constructed around three key focal areas (KFAs) namely, fixing priority issues, building capacity and sustaining the existing system of integrated WQM. These have some sense of time frames linked to each but all will have short to longer term dimensions. These will be developed in the implementation plan.

- **Fix priority issues**

  This will provide the opportunity to realise success in addressing key issues and will embark on looking at rehabilitation or remediation in critical catchments. This will also entail looking at priority issues that can support the building of capacity and the on-going application of exiting instruments.

- **Build capacity**

  Whilst it is understood that the capacity that the water sector requires will not be in place within the short term, in terms of skills, integrated information and systems, this is an important issue that needs to be driven immediately and continued over time in order to build adaptive management capacity. This also includes the development of cooperative partnerships across government, private sector and civil society.

- **Maintain and sustain the system**

  The on-going processes that the DWS has in place will continue to be utilised to manage water quality across the country. These instruments and systems may require

strengthening over time. This could involve exploring ways in which to improve and simplify some these instruments. This would include a drive to look at where instruments and systems can be integrated between departments in order to improve inter-departmental approaches.

In order to give effect to the vision, mission, goals and strategic objectives outlined in this strategy, a number of key actions are required, for example:

- Institutionalising and embedding the new approaches to WQM.
- Fast-tracking the establishment and capacitation of the CMAs in order to develop the CMSs.
- Development and finalisation of IWQM Plans for key catchments.
- Capacitation of WQM officials to perform their key functions.
- Updating data and information systems to strengthen WQM regulation.
- Formalisation of partnerships with both private sector and civil society to unlock capacity, skills and finances, however, more importantly, to bring the partners on board to co-create solutions for WQM.
- Implementation of the WDCS.

In the immediate term, an agreement, even if just in principle, needs to be achieved between the Department of Water and Sanitation and its sector partners in support of the inclusive, integrated and adaptive approach to managing water quality in the country.

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LIST OF ACRONYMS

Abbreviation	Meaning
ARC	Agricultural Research Council
BPEO	Best Practicable Environmental Options
CARA	Conservation of Agricultural Resources Act
CMA	Catchment Management Agency
CM&E	Compliance Monitoring and Enforcement
CMS	Catchment Management Strategy
COGTA	Department of Cooperative Governance and Traditional Affairs
CSIR	Centre for Scientific and Industrial Research
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DMR	Department of Mineral Resources
DPW	Department of Public Works
DTI	Department of Trade and Industry
DWA	Department of Water Affairs
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation
EDC	Endocrine Disrupting Chemicals
EIA	Environmental Impact Assessment
e-WULAAS	Electronic Water User Licence Administrative Application System
IWQM	Integrated Water Quality Management
IWQMP	Integrated Water Quality Management Plan
IWRM	Integrated Water Resource Management
IWUL	Integrated Water User Licence
KFA	Key Focus Area
MC	Management Class
MPRDA	Mineral and Petroleum Resources Development Act
NEMA	National Environmental Management Act
NDP	National Development Plan
NPSS	Non-Point Source Strategy
NWA	National Water Act
NWRS	National Water Resource Strategy
PAC	Project Administration Committee
PMC	Project Management Committee
PSC	Project Steering Committee

SA	Strategic Action
SAHRC	South African Human Rights Commission
SAICE	South African Institute for Civil Engineers
SALGA	South African Local Government Association
SBAMA	Systems Based Adaptive Management Approach
SI	Strategic Issue
SO	Strategic Objectives
SPLUMA	Spatial Planning and Land Use Management Act
SWOT	Strengths, Weaknesses, Opportunities and Threats
SWPN	Strategic Water Partners Network
TCTA	Trans-Caledon Transport Authority
WISA	Water Institute of South Africa
WDCS	Waste Discharge Charge System
WMA	Water Management Area
WSA	Water Services Authority
WQ	Water Quality
WQM	Water Quality Management
WUL	Water User Licence

1. INTRODUCTION

1.1 IWQMS Project Development

The Department of Water and Sanitation (DWS) has embarked on a journey to revise, update and consolidate its policies and strategies for managing the country's water quality and develop a pragmatic plan for the conversion of the policy and strategy into practice. This initiative consists of four, inter-connected phases that both inform and are informed by each other.

- **Assessment Phase** - Established the status quo with respect to water quality and Water Quality Management (WQM) practices and challenges in South Africa, institutional arrangements and the current WQM instruments. This phase also undertook a review of existing policies, strategies, and other relevant documents, both locally and internationally, to i) analyse the root cause of the water quality issues; ii) determine the gaps in WQM by conducting a SWOT analysis; iii) understand impacts that emerging trends may have on water quality, such as climate change, increased urbanisation, etc. and iv) look for innovative practices for WQM.
- **Policy Phase** - Based on the outcomes of the assessment phase, a **WQM Policy** was developed. The WQM Policy provided an integrated and concise framing for how water quality should be managed in South Africa by providing the overall vision and principles for how water quality should be managed. This policy is the first of two editions. The first edition is to be used to obtain further inputs from stakeholders and may be revised based on the outcomes of the Integrated Water Quality Management Strategy (IWQMS), which will be developed in parallel to the further improvement of the Policy.
- **Strategy Phase** – Provides the route map to give effect to the WQM policy and articulates the broader process of Integrated Water Quality Management (IWQM). The **strategic framing** defined the strategic intent for WQM by outlining the key strategic implications from both the assessment and policy development phases. This document outlines the Edition 1 of the IWQM Strategy that will be used for further discussion.
- **Practice Phase** – Will outlines the pragmatic approach to implementation and clearly articulates roles and responsibilities, resource (financial and human capacity) requirements, monitoring and evaluation framework and linkages and dependencies between key activities.

As sector lead, the Department understands that the management of water resources requires a sector-wide approach and this is a central theme within the second National Water Resources Strategy (NWRS-2). Similarly, the management of water quality requires that a broader engagement that moves roles and relationships beyond that of user, stakeholder, policy-maker and regulator, but towards one of cooperation, partnership and stewardship. This will require the development of robust and pragmatic management instruments, supported by effective communication and capacity building, both internally to the Department and externally.

1.2 IWQMS Engagement Process

Although there has been substantial work conducted as part of the project in order to identify the issues around water quality and WQM in the country, the true strength of this IWQM Strategy will lie in the extent to which implementers of the strategy and stakeholders have been able to conceptualise issues and the ability to develop appropriate strategic responses. Water quality management is a multifaceted and complex issue, affecting all South Africans, and as such, needs to be pursued in a participatory manner, taking into account the varying and differing perspectives of stakeholders (government, private sector and civil society).

Therefore, in the development of the IWQM Strategy, two processes of engagement will take place: **one to develop** the IWQMS (i.e. Edition 1 of the Strategy) and the second **to test and finalise** the IWQM Strategy (i.e. Edition 2 of the Strategy).

1.3 Purpose of the Document

IWQMS Edition 1 will be used as a discussion document to seek further inputs from a range of stakeholders. Nine provincial workshops are scheduled for October and November 2016 aimed at soliciting insight from provincial departments, proto-CMA and CMA representatives and their relevant stakeholders. The insights gleaned here will be presented at an Inter-departmental workshop to garner support for the IWQMS approach, determine how to collaboratively support the WQM Policy and the IWQM Strategy, and discuss the framework for establishing an Inter-departmental WQM Committee. Based on these and other inputs, IWQMS Edition 2 will be finalised.

1.4 Structure of the Document

The document is structured as follows:

Chapter 1 provides the overall rationale for the integrated water quality management strategy in South Africa and the structure of the document.

Chapter 2 provides a high-level situational analysis of water quality and water quality challenges in South Africa. The chapter also distils the WQM strengths to build on, the opportunities to seize, the challenges to address and the key reasons for failure and outlines the imperative to act.

Chapter 3 provides a synopsis of the paradigm shift in the way water quality management should be tackled, the principles and policy responses to support that shift.

Chapter 4 provides the policy response, vision, mission and goals for water quality management in the country.

Chapter 5 provides the strategic issues to be tackled, and outlines the objectives and actions to take.

Chapter 6 highlights the roadmap towards implementation and the way forward in terms of testing and finalising the IWQM Strategy.

2. THE IMPERATIVE TO ACT

There is a clear legal requirement, starting with the Constitution of South Africa and compelling socio-political, economic and environmental argument to be made for fixing the country's declining water resources. These arguments are elaborated below.

2.1 The State of WQ and WQM in South Africa

South Africa faces a wide range of water quality challenges impacting on both surface water and groundwater, originating from both point source discharges such as industrial processes and municipal WWTW, and from diffuse sources due to run-off from land. The pollution challenges manifest at various scales, differ between catchments, and have are different severity of impact. Add to that the increasing demands for limited water supplies, deteriorating raw water quality and changes in temperature and rainfall due to climate change all find themselves the makings of a perfect storm, if not addressed urgently, will significantly limit our socio-economic growth.

This deterioration in water quality is a key factor in this crisis and is **an economic and developmental issue**: -

- it **reduces the amount of water available** for use as more water must be retained in our river systems to dilute pollution to acceptable standards;
- it **increases the costs of doing business** as many enterprises are forced to treat water before being able to use it in their industrial processes and the cost of municipal water treatment increases;
- it **reduces economic productivity** as an increased number of work days are lost due to water-related illnesses and as poor water quality reduces productivity in certain sectors (e.g. poor water quality impacts on crop yields and makes crops vulnerable to import restrictions from countries with strict quality standards; and on recreation and tourism);
- it **threatens human health and livelihoods** where people are exposed to poor water quality for consumptive or domestic usage; and
- it **has environmental implications** where biological and chemical contamination of water can impact on important aquatic species.

Some of these impacts are clearly visible, such as major fish kills, whilst others are more insidious and long term. Combined, however, they are already having a significant negative impact on socio-economic development in South Africa.

The deterioration of water our quality in rivers, streams, dams, wetlands, estuaries and aquifers, is due to effluent discharges and run-off from urban and industrial areas, seepage and discharges from areas that support mining, and pollution from intensive agriculture:

- Sewage from urban areas is often not treated properly prior to discharge, due to inadequate or broken sewerage systems, overloaded or poorly managed sewage

treatment plants, aging infrastructure and poor management capacity at municipal level resulting in poor operation and maintenance of infrastructure.

- Many industrial processes produce waste that contains hazardous or even toxic chemicals that are discharged into sewers, rivers or wetlands.
- Waste products disposed of in landfills or slag heaps may release pollutants that seep into nearby watercourses or groundwater.
- The mining sector is a significant source of water pollution.
- Agricultural practices add to the pollution burden, with pesticides and fertilisers entering water resources.

Without a change in how land and water resources are managed, worsening water quality will continue to decrease the socio-economic benefits from, and increase the costs associated with, the use of the country's water resources.

2.1.1 Water Quality: The Key Challenges

Water quality and water quantity issues are inextricably linked. One of the elements of water quality management is recognising that water resources have a certain assimilative capacity which can dilute pollution to acceptable levels. Increased abstraction of water from our water resources has two impacts on water quality:

- firstly, it decreases the amount of water available in the water resources, resulting in reduced assimilative capacity and increased concentrations of pollutants; and
- secondly, a portion of the abstracted water is usually returned to the water resources at the tail end of the use processes, usually in a worse quality than when abstracted.

Thus, the **management of water quality in South Africa cannot be done in isolation from the management of abstraction, storage and use**.

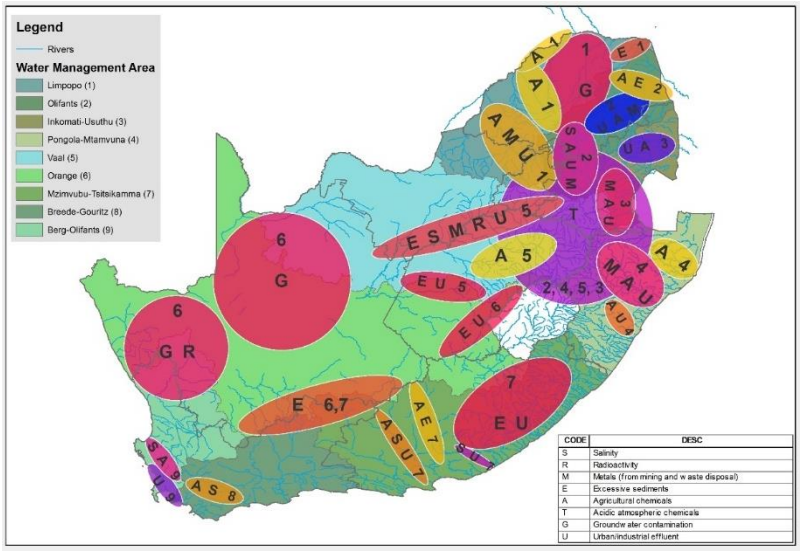

Figure 1: Map of the different types of water quality problems across in South Africa (adapted from CSIR, 2010)

Figure 1 summarises the major water quality challenges in different regions in the country (DWS, 2016a). The prevalence and/or severity of impact of particular water quality issues varies markedly from river system to river system and between water management areas.

The "*Water Quality and WQM Challenges in South Africa*" outlines 12 water issues (DWS, 2016a). Individually, these issues differ in terms of the following characteristics:

- the geographical extent of their impact;
- the cumulative severity of their impacts on the fitness-for-use of the resource, on water users' health, on the local and regional economy, and on local and downstream ecosystems;
- the extent to which they have been/are being monitored; and
- levels of technical/scientific knowledge and understanding of the above impacts, their temporal patterns and geographic prevalence.

Based on the above analysis five stand out as issues around which there is considerable knowledge for action, and the impacts are recognised as being highly significant. Each of these five issues emanate from various sources and have a range of factors that exacerbate their impact. **These are significant issues in terms of societal and economic impact and require a strategic, adaptive and action oriented approach, as such, will be prioritised for action in the IWQM Strategy.**

Table 1: Prioritised water quality issue and source of pollution

Eutrophication	Salinisation	Acidification/ Alkalinisation	Urban Pollution Runoff	Sedimentation
• Agricultural sources • Domestic wastewater • Urban stormwater runoff • Industrial emissions • Diffuse sources	• Natural sources • Agricultural sources • Industrial sources • Domestic wastewater • Diffuse sources	• Mining sources • Industiral sources	• Microbial pollution • Solid waste • Hydrocarbon sources • Sedimentation • Nutrient enrichment • Stormwater runoff	• Natural runoff • Agricultural sources • Urban runoff

Many of the other sources of pollution display localised effects (e.g. radio-activity and thermal pollution) or the level of knowledge, understanding or impact (e.g. nanoparticles, hydrocarbons) were too low to make informed decisions around their management., some of the remaining water quality issues, such as microbial (pathogen), agrochemical and metals pollution, are known to be potentially harmful, but due to inadequate monitoring and their geographical prevalence not being known, challenges exist in effectively managing these types of pollution. Monitoring to improve our understanding of these pollutants and their impacts will be strategically critical (DWS, 2016a).

As the economy develops, more pressure will be placed upon our water resources. In order to improve the management of these resources it is crucial to have a full understanding of the root causes of these water quality challenges and the way they are managed.

2.1.2 Water Quality: Root Causes of the Key Challenges

The five primary water quality challenges outlined above all have multi-sectoral characteristics and speak to the overlapping or adjacent mandates of a range of government institutions. For that reason, the requisite future management responses to these challenges will need to go well beyond the statutory and regulatory mandate, measures, controls, instruments and processes of DWS alone. ***The future management of these water quality challenges will need strategic regulatory collaboration and partnerships between DWS and various other state institutions across all three tiers of government, the CMAs, water boards, the private sector and organised civil society****.*

Therefore, in order to understand these primary water quality challenges, it is useful to explore the drivers, the root causes and the cooperative governance and civic partnership considerations relevant to these challenges. This understanding starts to provide insight as to how solutions should be formulated to improve water quality management. The **analyses ultimately point to deep seated institutional challenges, specifically with regards to cooperative governance** (These are summarised in the Appendix A and B.). Whilst there are some issues around technical capability, and a few point at social and political causes, the priority action is to address the institutional issues in order to have significant impact.

2.1.3 Water Quality Management: The Key Challenges

Despite considerable attention being paid to water quality management over the years by government, the current state of the country's water resources indicates that the management of water quality has not been as effective as required to ensure that water resources are sustainably used.

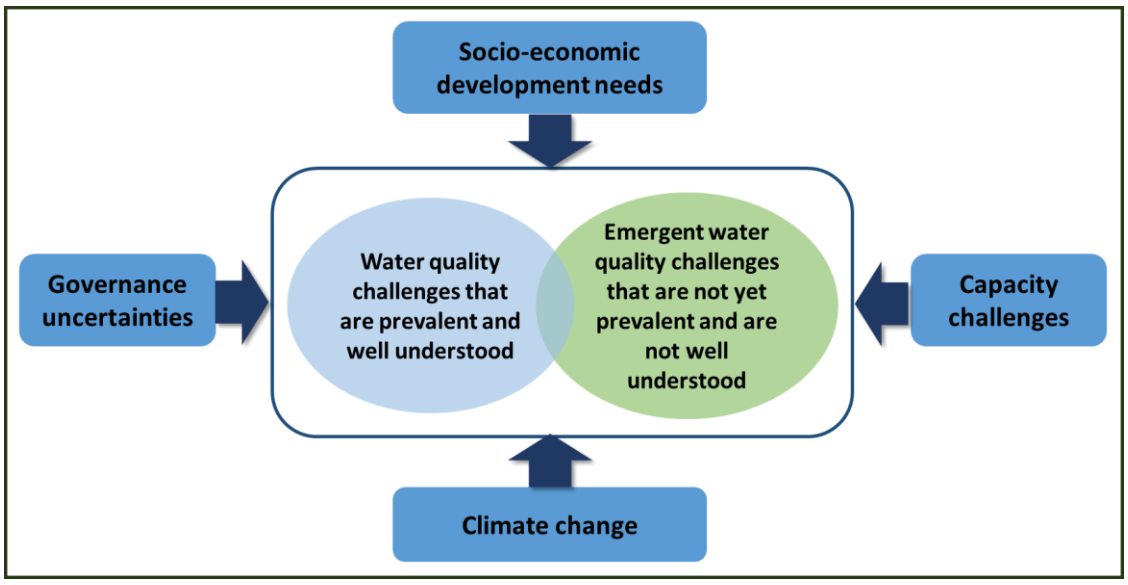

Figure 2: The complex nature of water quality management

The key issue is due to a number of complex and inter-connected challenges such as balancing of socio-economic development needs, on-going uncertainties in governance, challenges with appropriate technical capacity and impacts of global shocks like climate change and disasters (Figure 2).

Broadly, the challenges can be split into 4 categories: (i) Non-aligned policy, legislative and governance frameworks, (ii) Inappropriate practices, (iii) Insufficient finances and (iv) ineffective knowledge and information management. These are elaborated on below:

Non-aligned policy, legislative and governance frameworks:

- *Fragmented policies and implementation*
  - Current government policies and strategies are fragmented, and there is a lack of cooperative governance and alignment between different government departments and within the different spheres (national, provincial and local).
- *Insufficient cooperative governance* between different government departments to ensure effective water quality management with limited state resources both in relation to authorisation of activities that impact on water quality and in terms of compliance monitoring and enforcement.
- *Unclear regulatory responsibility and associated cooperative governance* pertaining to agriculture (DAFF), mining (DMR), and wastewater treatment (municipalities).
- Fragm*ented responsibility for WQM functions* is spread across various branches and units, with inadequate systems in place to ensure co-ordinated activities.
- *Delay in the development of Catchment Management Strategies*
  - The slow process of establishment of Catchment Management Agencies (CMAs) has led to a delay in the development of catchment management strategies (CMSs). These strategies are understood to play a key role in creating alignment between various sectors and stakeholders, and as such become a key strategic tool for enabling improved water quality management.
- *Lack of a Non-Point Source Strategy (NPSS)*
  - As part of the situation assessment in the three pilot areas for the WDCS, it became evident that a significant portion of pollution emanated from diffuse/non-point sources. This was not historically the case where, about a decade ago, the attribution of pollution from diffuse sources was approximately 20% of the load. In 2014, this attribution increased to approximately 60-80% in some of the catchments due to various reasons such as failing sewers, mine seepage etc. Whilst a NPSS was developed as part of the implementation readiness for the WDCS, it was never taken any further. In order to fully mitigate the issues around pollution, the issue of diffuse sources needs to be dealt with.

Inappropriate practices:

- *Inadequate measures to counter adverse land use practices*
  - Inappropriate practices for surface soil tillage, fertiliser application, riparian buffer zones and other cultivation land management needs for both agricultural crops and commercial timber plantations cause nutrient, chemical and sediment pollution in downstream water courses or underlying groundwater resources.

- Poor management of mining and industrial areas can result in waste water and stormwater wash-off polluting local streams, rivers and aquifers. Within municipal environments activities such as the development of poorly-serviced dense human settlements and reckless construction activities all can have significant impacts.

- *Challenges with treating wastewater*
  - A notable degree of dysfunction is present in the management of wastewater treatment works at municipal level. This is illustrated by the latest Green Drop report which rated almost 50% of 824 municipal wastewater treatment facilities as "critical" or "poor", resulting in extensive nutrient and pathogenic pollution of water courses due to untreated or inadequately treated sewage effluent from such facilities.
  - Dysfunction has a number of causes, primary among which are lack of technically qualified and experienced staff, poor maintenance of infrastructure, and weak financial management and billing systems.
- *Dysfunctional municipalities* also result in an increase in wide-spread urban runoff pollution, caused by a lack of implementation of best-management practices in urban land-use planning (residential, commercial, industrial, recreational, conservational), poor storm water management systems, and a lack of or poor enforcement of municipal by-laws.
- *Mushrooming of informal dense human settlements* in and around most urban centres during the past two decades due to rural-to-urban economic migration has caused steadily increasing diffuse source pollution of local and downstream water courses, as well as of underlying groundwater resources.
- *Lack of an integrated, catchment approach*
  - The Department of Water and Sanitation has recognized the gap, and catchment specific integrated water quality management plans (IWQMP) are in the process of being developed for prioritised catchments (Olifants; Crocodile-West;). However, the integrated, sectoral approach is required for more efficient planning and practice.

Insufficient financing:

- *Budget allocations for water quality management is insufficient* to address the water quality challenges of the country. This has implications for the number of staff, the nature of systems and the spatial and technical extent of our monitoring networks. The development of catchment based water management plans will underline the requirements in this regard.
- *Lack of broadened finance mechanisms*
  - Increasing the funding available through implementation of the Waste Discharge Charge System (WDCS).
  - Other options include access to donor funds, green funds, climate financing and more importantly, options around intergovernmental funding.

Ineffective Knowledge and Information Management:

- *Limited technical capacity in government*
  - General lack of technically skilled and experienced staff in DWS, resulting in weaknesses in authorisation of waste discharges by DWS, gaps in water quality

and compliance monitoring, including failure to take effective action against polluters.
    - General lack of technically skilled and experienced staff in municipalities contributing to high levels of pollution from municipal wastewater treatment.
    - Limited uptake of innovation from Water Research Commission (WRC) and other academic and research institutions
- *Major gaps in the monitoring system*, including the number and spatial extent of monitoring points, shortage of staff to carry out monitoring, and monitoring of new and emerging contaminants.
- *Insufficient translation of data into appropriate information* and *ensuring effective enforcement of regulations* based on the data.
- *Inadequate monitoring and assessment*

In addition, there are several trends which already are, or can be expected to unfold in South Africa over the next few decades, which may lead to new or accelerated water quality impacts in many locations across the country, such as:

- changes in rainfall patterns due to climate change;
- increases in water demand and changes in the rate of biogeochemical and ecological processes that determine water quality due to higher temperatures;
- increases in unconventional oil and gas extraction in the form of hydraulic fracturing;
- increases in population growth and urbanisation resulting in increases in growth of inadequately serviced densely populated settlements;
- increases in industrialisation; and
- increases in water demand due to the water-food-energy nexus.

Therefore, it will be important to develop a robust IWQM Strategy.

2.2 A Watershed Moment

South Africa is at a watershed moment. For many years there has been an assumption that the country generally has sufficient water resources to support the expectations in socio-economic development. The recent drought has underlined once again that water resources need to be managed in a careful and innovative manner. This especially so when one also considers that the options in terms of large scale infrastructure developments are becoming fewer as our reliance on water conservation and water demand management increases. Economic growth and the need to support the redress of historical social inequities will place further pressure on both water quantity and quality. This will beg of the country difficult questions in terms of water sector demands versus contributions to the economy and the employment opportunities that sectors provide. Furthermore, the country still has a large rural population that has a very direct relationship with the environment and water, and are

often exposed to the worst environments. At this watershed moment, we are reminded of the old adage about South Africa's water resource, namely, "too much, too little, too dirty".

2.2.1 A Country in a State of Flux

After two decades into democracy, South Africa is once again on the precipice of change. The challenges of governing a developmental social economy are multiple. Within the context of shifts in global power and economic downturn, these challenges are multiplied. This has played out in a frustrated populous that has reflected their desire for employment, security and improved services through various protests. These wishes are understandable, but the reality of supporting the kind of upliftment and empowerment that the country requires is not always fully understood. Clearly, government policy is focused upon creating jobs and addressing societal inequalities, but ensuring impact continues to be difficult.

In order to address these challenges government has started to create more platforms that enable the private sector and civil society to support processes. More effort is being focused upon forums and how these are supported, whilst strategic partnerships such as the Strategic Water Partners Network (SWPN) are being maintained. This drive has the benefit of bringing a range of insights and experiences into the problem-solving space, as well as importantly strengthening the social compact between government, the private sector and civil society.

The envisaged outcome is one of increasing stability through continued engagement and exchange, however, if parties chose not to engage and assist in co-creating the future, one can expect on-going instability which will be typified by extreme views and poor alignment. Water resource crashes and longer term damage to ecological infrastructure can be expected.

2.2.2 Transitional Institutions

The cohesive response of the broader water sector does need to be built upon a strong institutional platform. The institutional frameworks enabled by the NWA, and other legislation, have been in transition for some time. This has created some uncertainty regarding role and responsibilities, but most significantly has opened up the space for considerable amounts of non-compliance and unlawful water use. In particular, there have been significant delays in the establishment of CMA's. The institutions have a very important planning and regulatory role which needs to be realised through the implementation of a CMS. There has also been some institutional uncertainty around the delegations of powers and duties to the CMAs and this has also contributed to poor regulatory responses. The DWS is now resolving the delegations and is in the process to establish the next tranche of CMAs. The DWS is also currently in a process of restructuring in order to improve its delivery, noting the additionality that the sanitation function brings.

Over and above the internal structuring of DWS, there is the potential for legislative conflict or overlap between the various sector players, as well as the possibility of gaps that are not being addressed in terms of pollution control. For example, raw and drinking water quality

standards are imposed at the national level, with local government putting in place practices to meet these requirements, through a range of treatment processes. Provincial departments of environment have a concurrent competence of pollution control, which includes water pollution, resulting in potential overlaps. Cross sectoral responsibilities are more complex but have significant impact on water resources. This is typically the case for those departments, within all spheres of government, that manage land and ecological infrastructure, and which has real impact of water resource quality. The role of CMAs in creating the cooperative arrangements at the catchment scale is key and is part of their initial functions. They will play an important brokerage role between government departments within all spheres and hence balance the needs at the local levels with the interests at the national level.

2.2.3 Technology Shifts

New technologies push operational boundaries every day, ranging from agricultural technologies that enable greater yields with less water in a more variable climate, through to cost-effective renewable energy that enables desalination of sea water, to improved drilling technologies that enable access to deep aquifer groundwater resources, and to communications technology that allows connectivity between local, regional and global actors (Breede CMS, 2013).

With the advent of the smartphone, information is now at our fingertips. Simple data applications allow for the collection and sharing of information seamlessly, supporting the process to have active and engaged citizens. This has led to a plethora of studies that have shown the benefit that can be derived from citizen science and crowd-sourcing.

2.2.4 Water-Food-Energy Nexus

There is an on-going national debate around the water-energy-food nexus and aspects of the green economy opportunities for the country. One recognition is that an urgent change in our approach to energy production is needed, whilst ensuring food security as well as supporting the agricultural economy under water scarce conditions.

There is the pursuit of renewable energy and the shift away from coal to gas, has seen hydraulic fracturing come into the spotlight. Improvements in technology to capture this shale gas has made fracking a reality in South Arica, however, at what cost to the water resources. There is insufficient information to assess the impact of fracking on the country’s resources, and more information is required to fully assess the situation.

2.2.5 Building the Economy

As a developing country, South Africa needs to balance its strong desire for economic growth and development with the scarcity and preciousness of its natural resources. This means that difficult decisions need to be made regarding the direction and speed of growth, especially between competing economic sectors and the health and livelihood of the people

of South Africa. Prioritised water use as well as stricter enforcement of stringent measures to reduce water pollution should be vigorously implemented.

Water is a key part of the development of all sectors and as such water quality is an important dimension of ensuring that water resources do not constrain the developmental agenda. In so doing, water quality management becomes a key element of eradicating poverty and significantly reducing inequality by 2030. This is aligned to the shifts towards understanding the importance of green economy, the duality that economic growth can drive an "unsustainable" agenda of resource degradation and that overly excessive concern about the environment can hinder economic development (Global Water Partnership, 2012).

2.3 Aligning with National and International Strategic Imperatives

The Integrated Water Quality Management Strategy does not exist in isolation. It is informed by, and in some cases informs the following:

- **National Legislation:** The Constitution, The Bill of Rights, The Public Access to Information Act (PAIA), National Environmental Management Act (NEMA), Conservation of Agricultural Resources Act (CARA); National Water Act (NWA), Water Services Act (WSA), Spatial Planning and Land Use Management Act (SPLUMA), Minerals and Petroleum Resources Development Act (MPRDA) etc.
- **National Frameworks:** National Development Plan, National Water Resource Strategy 2 (NWRS-2), Strategic Framework for Water Services, National Non-point Source Strategy (NNPS)
- **International Obligations:** The Sustainable Development Goals (SDGs), Agenda 21, Agenda 2063, Africa Water Vision, UN-Convention on the Law of the Non-Navigational Uses of International Watercourses, Hyogo Framework for Action, etc.
- **Regional Protocols:** SADC Protocol for Shared Watercourses, Regional Strategic Actin Plan (RSAP), etc.
- **Bilateral/Multilateral and Basin Wide Agreements:** Limpopo Watercourse Commission (LIMCOM), Orange-Senqu River Commission (ORASECOM), Rivers of mutual interest, etc.
- **National Policy Development:** Sanitation Policy, WQM Policy, Mine-water Management Policy, Irrigation Policy, Wetlands Policy, etc.
- **Other Strategies:** National Groundwater Strategy (NGS), Catchment Management Strategy (CMS), Waste Discharge Charge Strategy (WDCS), etc.
- **Implementation plans and guidelines:** Integrated Water Quality Management Plan (IWQMP), Agriculture Policy Action Plan (APAP), Water Services Development Plan (WSDP), Integrated Development Plan (IDP), Norms and Standards, etc.

Figure 3 places the IWQMS in context, noting once again, that this Strategy does not sit in isolation, instead both informs and informs various international, regional, national, sectoral and local frameworks.

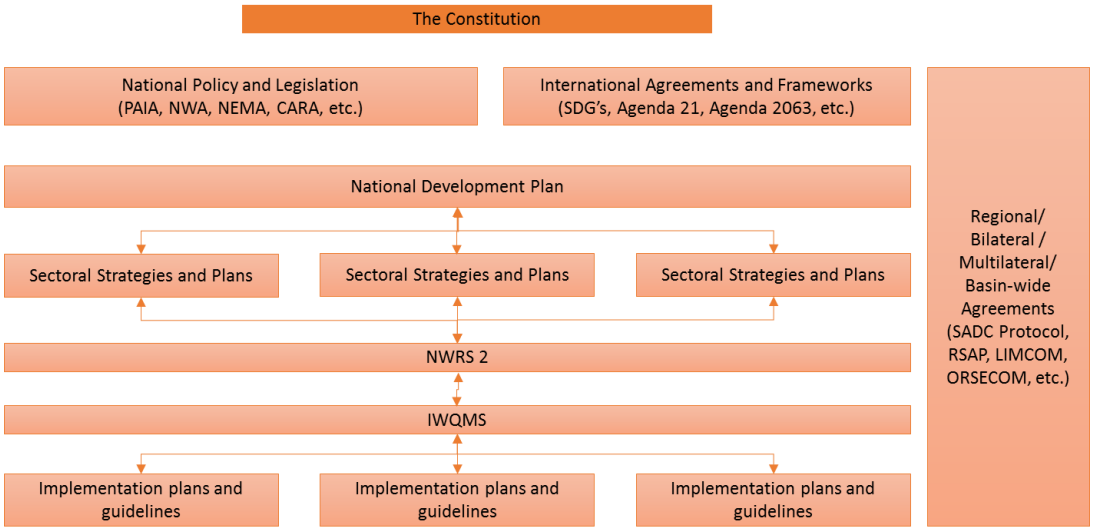

Figure 3: Aligning IWQMS with Key Obligations

Presented below are the key national and international imperatives that this IWQM Strategy needs to align with.

2.3.1 The Constitutional Imperative

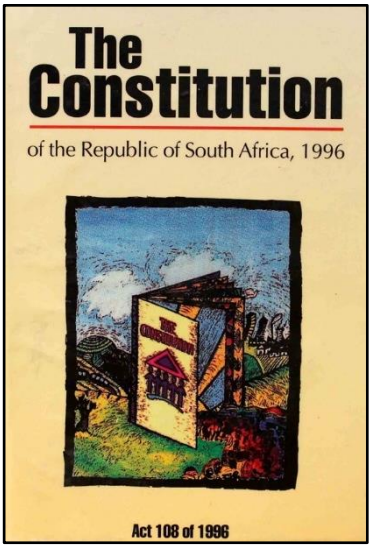

Figure 4: The Constitution of RSA, 1996

The Constitution places a duty on the national Government, in co-operation with the other spheres of government, to make sure that our limited water resources are used to improve the quality of life of all South Africans. The legal and policy framework for water resources protection begins with relevant provisions in the Constitution of South Africa (1996), and cascades down through national policy to legislation supported by secondary legislation or regulations. Furthermore, "by elevating the environment to a fundamental justiciable human right, South Africa has irreversibly embarked on a road which will lead to the goal of attaining a protected environment by an integrated approach, which takes into consideration, inter alia, socio-economic concerns and principles."[1]

The Constitution creates concurrent national and provincial

[1] BP Southern Africa (Pty) Ltd v MEC for Agriculture, Conservation and Land Affairs 2004 (5) SA 124 (W) at 144D

competence in the realm of pollution control, allocates storm-water management, water supply and sanitation to municipalities, and allocates water resources management (which includes management of water quality) to national government. However, the legislative and administrative competence has consequences for integrated pollution control. For example, raw and drinking water quality standards are imposed at the national level, and local government must put in place practices to meet these requirements, including through treatment of potable water, treatment and management of sewage and waste water, management of storm water, and management of solid waste. Provincial departments of environment have a concurrent competence of pollution control, which includes water pollution. There is the potential for legislative conflict or overlap between the various players, as well as the possibility of gaps that are not being addressed. While co-operative governance is thus a critical element of water quality management, current practice suggests that water pollution control has not been dealt with in a sufficiently inclusive and integrated manner, and that improvements in this regard are required to get improved impacts with limited state resources. To this end, the WQM Policy calls for an inclusive and integrated approach to managing the country's water quality.

2.3.2 The National Development Plan

The National Development Plan (NDP), supported by the NWRS will be the key drivers for the IWQM Strategy over the next 5 to10 years at least. The primary aim of the NDP – 2030 (NPC, 2012) is to eliminate poverty and reduce inequality by "*growing an inclusive economy, building capabilities, enhancing the capacity of the state and promoting partnerships throughout society*." This will be undertaken within the international context of the sustainable development agenda as well as Agenda 2063 which are both aimed at ensuring inclusive growth and sustainable development. Noting that previous strategies have been designed to provide more effective governance towards resource protection, this strategy must move beyond this towards providing a pragmatic roadmap to support sustainable development. As such this strategy needs to unlock key actions and align with the current (and future) edition of the NWRS and consequently with the NDP.

The NDP recognises of the importance of shifts in the global economy, rural-to-urban economic migration; increased urbanisation, climate change and the continent's economic growth, in order to try and understand the resources and capabilities required to address these shifts.

The key departure point being that **all sectors need to jointly contribute to the vision and objectives of the plan**. This is an important centrality that takes South Africa away from a more programmatic approach towards one of recognising that integrated action is essential.

The NDP is looking to prioritise and address the challenges in rural agricultural development, the requirements for economic infrastructure build, the need for increasing partnerships with the private sector, obligation to address the crisis in healthcare management, commitment to increasing vigilance in the protection of the environment, the duty to professionalise the public sector, and the responsibility to strengthen accountability and improve coordination.

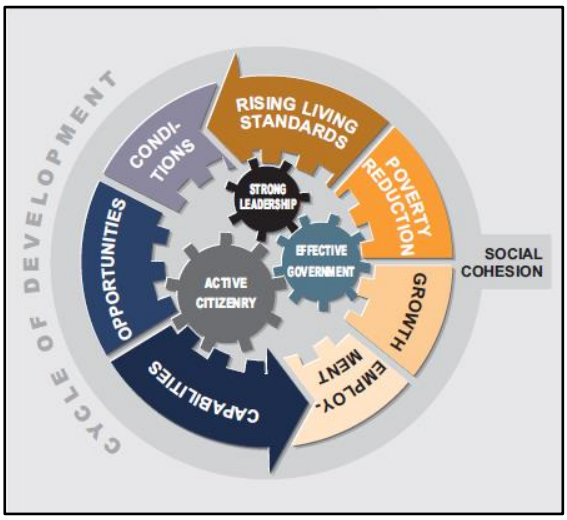

Figure 5: The NDP's approach to change (NDP, 2012)

In order to manage these challenges, the NDP's approach to change (**Figure 5**) **identifies active citizenry, together with effective government and strong leadership as key drivers** of the country's development and support towards social cohesion. Concerns around the state's capacity and capability to implement identified actions are also concerns experience in managing the country's water quality.

The one critique of the NDP, is that even though it addresses water as an economic infrastructure, it mainly alludes to ensuring that the countries water supply issues are a top priority, with making little to no reference to the ailing effect of the quality on the country's resources**.** The alignment of the NDP to the Sustainable Development Goals (SDGs), see below, is also important in taking the country forward.

2.3.3 The Sustainable Development Agenda

The Sustainable Development Goals or SDGs (**Figure 6**), adopted in September 2015, are aimed at ending poverty, protecting the planet, and ensuring prosperity for all as part of a new sustainable development agenda. South Africa, as a signatory to the SDGs, must strive to meet the targets under each of the SDGs. Water quality has a direct bearing on our ability to meet the goals of ending poverty, ending hunger and achieving food security, ensuring healthy lives and promoting sustainable economic growth. In relation to Goal 6: Ensure availability and sustainable management of water and sanitation for all, water quality is particularly relevant. Under Goal 6, there are three targets that are particularly relevant to water quality:

Figure 6: The Sustainable Development Goals

- By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally
- By 2030, implement integrated water resources management at all levels, including through trans-boundary cooperation as appropriate

- By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes.

These SDGs mirror the sustainable socio-economic development path of South Africa as outlined in the National Framework for Sustainable Development (2008): *"South Africa aspires to be a sustainable, economically prosperous and self-reliant nation state that safeguards its democracy by meeting the fundamental human needs of its people, by managing its limited ecological resources responsibly for current and future generations, and by advancing efficient and effective integrated planning and governance through national, regional and global collaboration".*

The **SDG's further illuminate the link that a healthy water resource is required from both a security and development point of view**. It is precisely for this reason, that the WQM Policy, and subsequent **IWQM Strategy, seeks to redress and elevate WQM to not only a water quality issue, but a development and socio-economic issue as well.**

2.3.4 The National Water Resource Strategy

The 1998 Water Act required the establishment of a NWRS by the Minister of Water. At the same time, a decentralized approach to water resources management was introduced, with the Act requiring the establishment of CMAs that have the responsibility to develop and implement a CMS that is consistent with the framework provided by the NWRS. The South African water resources planning framework is based on the international principles of IWRM. However, the complexity of integrated planning and the capacity needed to implement the results have outstripped the ability of the country to deliver.

Whilst the first NWRS (DWAF, 2004) set out the policies, strategies, guidelines and procedures for the management of water in the country, as required by the National Water Act, 1998 (No. 36 of 1998). The updated strategy, NWRS-2, aims to "ensure that national water resources are managed towards achieving South Africa's growth, development and socio-economic priorities in an equitable and sustainable manner over the next five to 10 years."

The strategy also responds to the priorities set by government in the NDP and NWA imperatives that support sustainable development. Under the NWRS-2 are a number of national thematic plans, including the National Climate Change Strategy for Water Resources. The NWRS-2 has been described by the National Climate Change Response White Paper as setting out the short-term response to climate change, with the Water for Growth and Development Framework (WfGD) 2030 seen as the medium to long-term responses. It recognises that climate change will increase the pressure on already stressed water resources, further impacting on water quality, and there is thus a crucial requirement for the effective management, use, allocation and re-allocation of available water resources. The **revised NWRS-2** has incorporated aspects of the WfGD that pertain to water resource management as key core strategies and further **looks to adopt a sectoral approach in its implementation.** Whilst the water quality issues are illuminated in the NWRS-2, it lacks the

appropriate strategy to deals with both the water quality issues, as well as issues around WQM. It is this very lack of approach to WQM, that initiated the development of this current project to support the future revisions of the NWRS.

2.4 Shifting Gears

To move forward, South Africa needs the following:

- a change in direction by benefiting from national and international experience and insights;
- an increase in speed by capitalising on the existing strengths in managing water quality; and
- an increase in momentum by seizing and employing new opportunities that present themselves.

These are further elaborated below.

2.4.1 Learning from International and National Experience

This strategy builds on South African and international experience in managing water quality, drawing on good practice from both to develop an effective and implementable strategy. It also draws on the excellent work of South African researchers and innovators in the field of water quality and environmental management in how to address this complex, wicked problem.

Both in South Africa and globally it has been recognised that managing water quality requires a systems-based approach, coupled with adaptive management techniques, and supported by strong partnerships between government, civil society and the private sector.

This means seeing the catchment as an integrated social and ecological system, in which human and bio-physical elements interact. The challenge in managing a system like this is that a system is not the sum of its parts, but the product of a vast number of on-going interactions between different elements of the system. Complex systems do not respond in simple and linear ways. Predicting trends and responses accurately in complex systems of this nature is difficult, if not impossible.

Adaptive management allows one to work in a complex system like this, to put in place management responses to identified challenges, and then to see how the system responds. Conscious learning based on the feedback from monitoring and evaluation allows managers to adapt their actions to achieve better results. While adaptive management is receognised as the appropriate approach, implementation is much harder, and requires investment of time and commitment. Adaptive management requires a profound shift away from crisis management to a proactive and deliberate approach to solving problems.

The second part of the approach is the bringing together of relevant stakeholders from government, civil society and the private sector to develop a common vision for water quality management, and to develop joint approaches to solving the complex problems facing the catchment.

This systems-based, adaptive management approach (SBAMA), as adopted in this strategy, is supported by a suite of tools ranging from conventional command and control tools, to innovative approaches such as citizen-based monitoring and science, the use of administrative penalties, and economic instruments such as the Waste Discharge Charge Strategy (WDCS).

2.4.2 Water Quality Management: The Strengths to Build on

Government already has a number of initiatives to support good water quality management and are strengths that can be built on. These already provide a strong foundation from which WQM can be improved. These are:

Strong legal and policy frameworks that are well articulated:

- Sound statutes, policies, strategies and regulations: Constitution, NEMA, CARA, MPRDA, SPLUMA, NWA, WSA, NWRS, CMSs, WDCS, e-WULAAS, etc.
- "New" Water Act can strengthen focus on WQM.

Considerable governance and institutional frameworks:

- CMA establishment process recently prioritised and delegation of roles finalised.
- Willingness by DWS officials to collaborate with other Government and private sector institutions in support of WQM.
- Strong water institutions – e.g. TCTA, Water Boards, Regional Water Utilities.

Robust regulatory instruments:

- Incentive based regulation at municipal level, e.g. Blue-, Green- and No-Drop accreditation, is now well-established.
- Sound water quality management instruments - guidelines, protocols, manuals, strong licensing process.
- Classification and RQOs development in progress and RQO implementation will be facilitated by the DWS project on operationalising RDM
- New integrated NWIS system being developed.
- IWQMS project has been initiated.

Established monitoring network and information systems:

- DWS and CMAs mostly have reasonable water Q data to support decision-making.
- Increased strategic spatial coverage of monitoring network (Project underway to identify localised monitoring gaps and to prioritise their resolution).
- Growing appreciation among water resource planners and managers that water quality and quantity should be managed as an integrated whole.
- Sound chemical analysis laboratory facilities, accredited by SANAS, at national & regional levels.

Increasing knowledge and information:

- IWRM is a central competency in DWS and CMAs.
- Pockets of scientific and management excellence in Government, CMAs and other local institutions.

- DWS and DEA have embarked on increasing capacity in CM&E at national level.
- Internal WQM training course has been partially re-instated and investment in relevant graduate training programmes.
- Alignment of DWS bursaries with scientific implementation needs of the Department, i.e. Learning Academy for graduate trainees.
- Continuity of research funding by WRC relevant to WQM.
- Ability of Government to mobilise in times of water crisis.

2.4.3 Water Quality Management: The Opportunities to Seize

There are number of opportunities, that if seized correctly, will allow for a significant improvement in the way water quality is being manged and can act as game-changers:

Opportunities to elevate WQ and WQM in Policy Review Process:

- DWS is currently in a process of *reviewing its current policies, and amalgamating the NWA and WSA.* The NWRS-2 will evolve to include water service functions. There are also a number of new policies being developed that will support WQM around mine-water management, wetlands, energy, hydro-fracking, partnerships, etc., that provide an opportunity to strengthen WQM.
- DAFF, DMR, DEA are also in the process of developing policies to improve water quality and its management (Mine-water management Policy, etc.)

Opportunities from renewed focus on Cooperative Governance/Partnerships:

- *Water stewardships*/CEO Water Mandate – Alliance for water stewardship has developed standards and protocols.
- *Integration of monitoring and sharing of resources* relevant to WQM through collaboration among government institutions.
- *Involvement of private sector and civil society* to support WQM through a dynamic sector-based programme.
- *Incentivising of water users, industries and businesses* to reduce water pollution.
- *On-going DWS/CMA engagement of sectoral and social stakeholders and partners* and promoting the concept of joint custodianship of WQM (e.g. implementation of the NWRS-2)

Opportunities to have a more integrated planning processes:

- Recognised need for *not only water quality, but quality of water* required to support the National Development Plan (NDP).
- *WSDPs and IDPs should give WQM priorities prominent consideration*.
- *Sustainable Development Goal (SDGs)* actions given RSA's signed commitment; e.g. use of SDGs to influence IDPs.
- *Climate Change* – raises the profile of WRM, including WQM.
- *Establishment of CMAs*, and development of CMSs provide opportunity for integrated, sectoral approach to catchment management.

Opportunities for Innovative Funding:

- *Green Fund/Climate Funds* - DBSA initiative to investigate issuing of water bonds.

- *NBBN and other investments in ecological infrastructure;* SANBI's ecological infrastructure directorate funds eco-infrastructure critical for WQM.
- *Financial incentives for water re-use.*
- *Financial incentives (including donor funds) for municipalities* to maintain declared targets for WQM.
- Economic down-turn - *WQM institutions to be more effective with spending,* finding innovative ways of treating water and seek alternative sources of funding. Also provides an opportunity to ensure WQ is taken into account in grant processes.

Opportunities to strengthen and support WQM capacity:

- Organised civil society activism - *engaged public can contribute to monitoring and management of WQM.*
- *Improved and integrated multi-institutional WQM awareness campaigns* - lead by DWS.
- *Improved and supported Civilian Science,* e.g. Adopt-a-River – typically used to spot major problems that need urgent attention, e.g. spills, illegal activities.
- Drought and other water-related crises, such as pollution events – *mobilise political attention, raise profile of water management and engender innovative approaches to support WQM.*
- *Use of social media* by DWS and CMAs to mobilise public knowledge banks and public sense of custodianship.
- DWS to take the lead to *develop and support a compendium of external WQM-related training courses* conducted by various universities, Council for Scientific and Industrial Research (CSIR), WISA, ARC, SAICE, etc.
- Opportunities for *further research on water quality and WQM* issues through WRC and other academic and research institutions

2.5 Development Scenarios

This strategy is aimed at short term responses that build towards a longer term objective. This means strategizing into an uncertain future. Scenario planning has become a useful tool for considering response to uncertainty and can outline key focal areas for attention. In considering these scenarios it is clear that two core themes act as drivers, namely, our ability to regulate and manage the resource in a sustainable manner and the degree to which participation is enabled (**Figure 6**). These scenarios are as follows.

SCENARIO 1: Everyone for themselves

There is continued growth, albeit slowly. Continued inequality and limited cooperation maintains the current status quo in the broader social economy fuelling discord. This is not helped by the inadequacy of institutional capacity, which also plays out into the regulatory arena where there is insufficient regulation of water use or waste discharge, causing a steady degradation of water resource quality. Strong individual interests are dominant with limited to little consideration of common interests or the needs of marginalised communities.

Under this scenario water is considered as an input to economic development with limited understanding of environmental and social requirements. Economic growth is therefore a primary objective and the requirements for commercial and municipal use of water increases with production and population growth. As a result, the degradation of environmental resources is on-going.

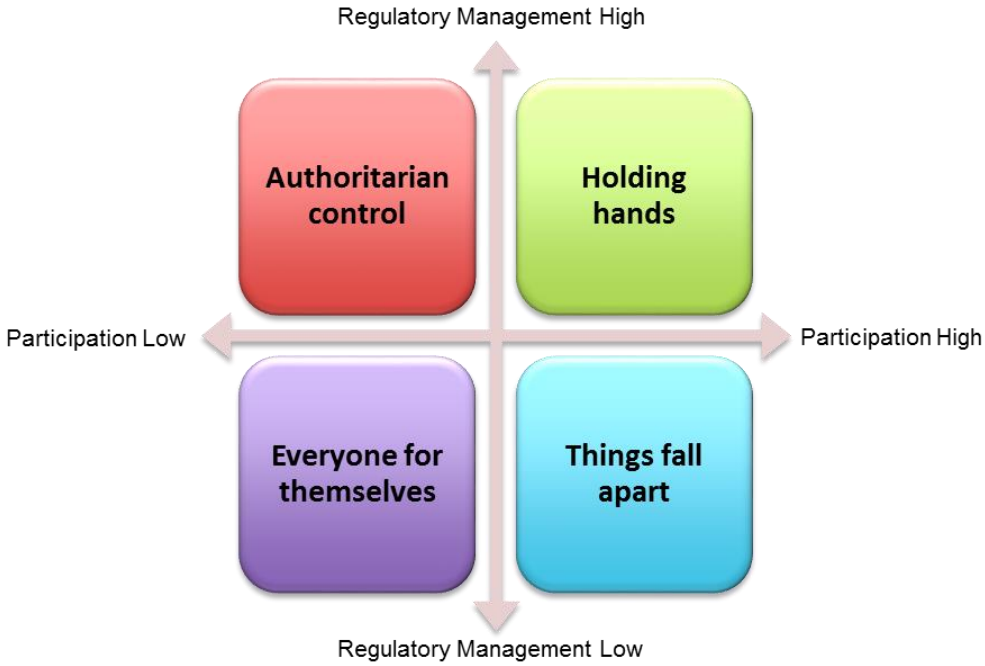

Figure 7: Four future scenarios for the management of water quality

SCENARIO 2: Things fall apart

This scenario is characterised by increased participation and engagement noting the importance of this in steering away from a scenario where everyone selfishly overexploits the country's natural resources. However, with limited institutional capacity and ineffective policy there is poor oversight and regulation. There are sound instruments for the management of water resources, but capacity constraints hamper the ability to apply these effectively. As a result, whilst there is some social cohesiveness and participation there are explosive reactions to inequalities and failure to redress societal challenges. There are still on-going debates and discussions, but the sense is the country lurches from one crisis to the next. This impacts upon economic growth, which implies little significant increases in water requirements from agricultural or urban users, although the existing use is become less efficient with a failure to implement water conservation measures. Environmental quality and role of ecological infrastructure is understood, but not prioritised and regulatory control cannot be maintained, Hence, there is continued degradation albeit at a lower level than what may otherwise be expected.

SCENARIO 3: Authoritarian control

The recognition of the need to support social and economic growth drives the government to take strict action against unlawful water use. This has required a rapid upscaling of capacity within DWS and the CMAs as well as significant shifts in systems capabilities to underpin this regulatory approach. This tight control is aimed at providing the resource capacity to redistribute water and address inequalities in water use across the country. However, the lack of participation in the face of a firm command and control approach has caused significant rifts in the water sector, so that despite the approach, unlawful water use continues to place the resource under increasing pressure. The lack of discourse over the needs of the economy results in slower growth than could be expected. Water resource quality continues to degrade despite the firmer regulation.

SCENARIO 4: Holding hands

With the water sector working more cooperatively there is sustained development, growth and institutional strengthening. The development of functional partnerships with the private sector and civil society has created a better understanding of social, economic and environmental needs. Inter departmental cooperation underpins these partnerships. This provides a favourable environment for balanced and effective water resources protection, development, sharing and efficient use. This fuels strong economic growth and hence increased demands for water associated with economic development and urban population growth. Understanding of the needs of rural communities results in the establishment of viable commercial farms by emerging farmers supported by organised agriculture and large corporate business. The discourse with civil society helps to shape an understanding of the importance of environmental functioning to support ecosystems, local tourism and greener residential areas. This underpins a drive for improved efficiencies in water use. To this end regulatory initiatives are strengthened, but the support of this by the private sector and civil society provides the basis for a more cooperative approach that is typified by self/peer regulation as well as support from local institutions.

Whilst it is clear that Scenario 4 presents a desired outcome, it is of importance to understand what these scenarios imply in terms of attaining this desired state. The first scenario is in effect the counterfactual in that we realise this would not be a sustainable future. Scenario two does require a stronger regulatory response as well the strengthening of the instruments and systems that would be required to support sustainable resource development. Success in strengthening regulation as well as success in addressing key water quality management issues would bring societal groups together to further strengthen partnerships. This clearly requires an upscaling of capacity. Scenario three requires a rapid upscaling of institutional capacity due to the failure to effectively court partnerships. The failure to establish partnerships isolates water use groups and so the need to shift the capacity away from firm regulation towards cooperative partnerships would be more effective in creating the discourse needed.

These scenarios then reflect core strategy elements as being the development of partnerships (government-private sector-civil society); improvement/ strengthening of existing instruments and systems; and the development of strengthened capacity within DWS and the CMAs in order to provide the drive and support required.

2.6 Time to Act

South Africa is feeling the negative impacts of poor water quality, and without swift and concerted action, the impacts will worsen over time. The necessary tools and knowledge to affect significant change exists and is sufficient to turn the situation around, however, the challenge lies in integrated, co-ordinated, adaptive and effective action from government, civil society and the private sector working in collaboration.

This strategy, therefore, forms a call to action for government, civil society and the private sector, to change the management of water quality and to bring about a measurable improvement in the quality of raw water across the country.

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3. STEPS TOWARDS A PARADIGM SHIFT IN WQM

3.1 Strategic Intent of the Policy

The Department of Water and Sanitation has developed a number of strategies and programmes to manage water quality over the past decades. Despite these, water quality challenges in the country have continued to grow, and the state of our water resources continues to decline. Clearly, then, the current strategies are not effectively dealing with the increasing water quality challenges arising from, amongst other things, economic and population growth, historical legacies, and aging infrastructure.

To be able to address current and future challenges, a new approach is required, one that builds on the successes of the past, corrects the weaknesses, and draws from best practice internationally. In line with this, the IWQM Strategy is developed based on a set of principles outlined below.

Principles for the Development of the IWQMS

i. It is aligned with the strategic objectives of the policy, while being consistent with broader water and development strategies (NDP, NWRS-2)
ii. It is focused on a short to medium timeframe, while building a platform for future strategies in line with the policy and visions for water quality management
iii. It prioritizes a limited number of critical concerns, while ensuring that other issues are addressed through on-going management or monitoring for future prioritisation
iv. It is relevant at national, catchment and local scales, while ensuring horizontal alignment across sectors and institutions at each scale
v. It provides the strategic intent and framework for actions to be described in the implementation plans on a short-term perspective
vi. It allows for adaptive response to changing circumstances and achievements based on effective on-going monitoring and evaluation, during its timeframe

Each of these is discussed in more detail below.

3.2 Strategic Policy Alignment

The strategy is aligned with the strategic objectives of the policy, while being consistent with broader water and development strategies (NDP, NWRS-2)

There are two critical strategies/plans that inform this strategy. The first is the NDP which sets overarching priorities for the whole of government. The second is the NWRS-2, which sets the direction and targets for water resources management in the country as a whole.

The NDP has a number of strategic objectives and enabling factors that serve to shape the priorities of government. Of these, several have direct relevance for this strategy:

- ***By 2030 Eliminate income poverty*** – improved raw water quality will contribute to a reduction in the cost of doing business, a reduction in the cost of treating water, and a reduction in the illness burden on poor households. All of these will contribute to economic growth and the potential to eliminate poverty.
- ***Increase employment from 13 million in 2010 to 24 million in 2030*** - the implementation of this strategy will result in increased employment opportunities in managing water quality, from low level to highly skilled jobs, directly in the sector, and indirectly in the private sector.
- ***Establish a competitive base of infrastructure, human resources and regulatory frameworks*** – implementation of this strategy will result in an improved regulatory system for water quality, as well as improved infrastructure management, particularly waste water treatment works. It will also serve to improve human resource capacity for water quality management in the public, private and civil society sectors.
- ***Ensure that all South Africans have access to clean running water in their homes*** – improvements in raw water quality will reduce the costs and challenges of providing potable water to all residents of South Africa.
- ***Realise a food trade surplus, with one-third produced by small-scale farmers or households*** – improved water quality will free up more water for use, whether by industry or in agriculture, as the requirements for dilution of heavily polluted water decrease.
- ***Ensure household food and nutrition security*** – enteropathic diseases, including those resulting from contaminated water, reduce the ability of people to retain and absorb nutrients, reducing their nutritional status. Improved water quality, particularly in relation to microbial pollution, will contribute to improving the nutritional status of poor households in South Africa.
- ***Realise a developmental, capable and ethical state that treats citizens with dignity*** – this strategy will enable a developmental and ethical approach to water quality management, recognising and protecting the rights of all people living in South Africa to an environment that is not harmful to their health or well-being.

The NWRS2 has as its overarching vision: Sustainable, equitable and secure water for a better life and environment for all.

This is supported by three objectives:

i. Water supports development and elimination of poverty and inequality
ii. Water contributes to the economy and job creation
iii. Water is protected, used, developed, conserved, managed and controlled sustainably and equitably.

These objectives are supported by seven strategic themes, of which the following are particularly relevant to this strategy:

i. Water resources planning, development and infrastructure management
ii. Water resources protection
iii. Regulation of the water sector and

iv. International and transboundary water resource management.

The objectives and actions outlined in this strategy support these objectives of the NDP and the NWRS2, through a practical and achievable approach.

3.3 Time frames

The strategy focuses on a short to medium timeframe, while building a platform for future strategies in line with the policy and visions for water quality management

This strategy will form a chapter of the NWRS, and as such, will be due for review every five years. In line with this, the key focus of the strategy will be on critical and prioritised actions for a short to medium timeframe 5 years of the strategy, while also framing longer-term the actions that must be undertaken to achieve effective water quality management. In addition, the strategy will clearly set out the actions that need to be taken in the short term in order to build sufficient capacity, or set up the foundations for, work to be undertaken in the medium to longer term. This will include, for example, the research and information requirements in the shorter term that are needed to improve water quality management in the future, including with regard to emerging contaminants (Figure 1)

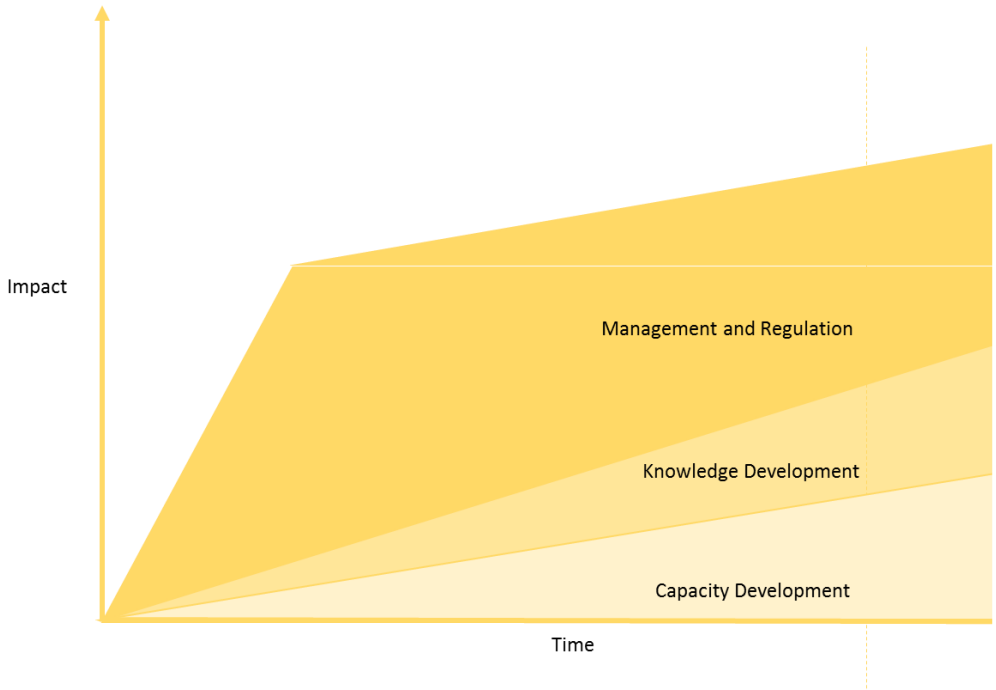

Figure 8: Impact and Timeframes for Building IWQM

3.4 Prioritised actions

The strategy should prioritize a limited number of critical concerns, while ensuring that other issues are addressed through on-going management or monitoring for future prioritisation

It is not possible for the state to address all of the many water quality challenges simultaneously, and this strategy is, therefore, focused on delivering change for prioritised challenges. The bulk of the water quality management resources of the state will, therefore, be focused on these priorities. This does not mean, however, that work on other areas pertinent to water quality will not continue, but it serves to guide the allocation of human and financial resources for the 5-year period of the strategy.

The critical priorities addressed in this strategy are:

- Introducing the ***systems based, adaptive management*** approach – a critical element of this strategy is building, within relevant government departments, and with key private sector and civil society stakeholders, a systems-based, adaptive management approach to water quality management, at the national, catchment and sub-catchment levels, which includes improved integrated water quality planning.
- ***5 key pollution challenges*** – the strategy is focused on ensuring the management of 5 priority pollution challenges:
    - Eutrophication – which includes resolving issues of poorly managed and dysfunctional WWTWs as well as non-point source pollution from agriculture;
    - Salinisation – which arises from urban, industrial and agricultural sources
    - Urban pollution – which includes the issue of pollution arising from storm water and the pollution of urban rivers
    - Sedimentation – which arises from poor land-use practices
    - Acid Mine Drainage – which requires addressing the legacy of abandoned and ownerless mines as well as present and future mining operations;
- ***Legislative amendment*** – it is important to amend relevant legislation to support the implementation of this strategy;
- ***Capacity building*** – it is critical to act swiftly on the issue of capacity, not only to implement the strategy in the short term, but in order to ramp up the capacity to manage increasing water quality challenges in future. A critical element of this is ensuring that CMAs are established, and are delegated significant water quality management functions over and above their inherent functions.
- ***Intergovernmental relations*** – In order to achieve the government-wide approach set out in the policy, a key step will be to put in place the necessary intergovernmental structures and to build the relationships between key government departments at provincial and national level.
- ***Financing*** the strategy – a critical element of being able to implement the strategy is increasing the financial resources available for water quality management. In this regard, the implementation of the WDCS is a high priority.

- Stricter ***enforcement*** – the strict enforcement of licence conditions, through a partnership between DEA and DWS is a critical priority if raw water quality across the country is to be improved.

3.5 Scale and sectors

The strategy should be relevant at national, catchment and local scales, while ensuring horizontal alignment across sectors and institutions at each scale

The strategy has been developed so as to be relevant at different scales (transboundary, national, catchment, local), while also dealing with issues that are specific to certain sectors. In terms of the issue of scale, the catchment level is seen as critical, with the development of catchment management strategies a key tool in the strategic, adaptive management of water quality.

Figure 9 outlines the approach that has been adopted in terms of the different scales of implementation. At the national level, the policy, institutional arrangements and enablers of improved water quality management are set out, including improved horizontal alignment between national organs of state. These support the strategic, adaptive approach taken at the catchment level, through the catchment management strategy. At the catchment level, engagement with relevant provincial departments and regional offices of national departments is critical, as is engagement with the private sector and civil society. The catchment strategy then serves to guide implementation at the local level.

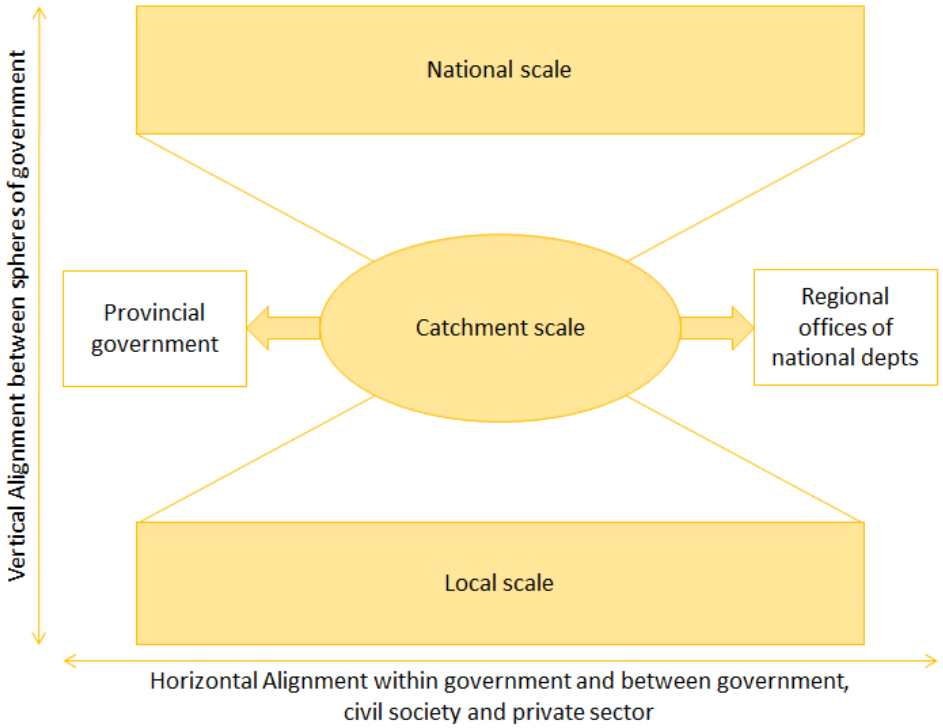

Figure 9: Scale and alignment for the implementation of the IWQMS

Within these different scales, the catchment (or sub-catchment) is the critical level at which the bulk of the implementation of the strategy and the action plan will take place. The actions taken at national level are intended to support, regulate and oversee what happens at the catchment level. Actions at the local level inform and support the implementation of the catchment level integrated water quality management plan.

3.6 Supporting implementation

The strategy should provide the strategic intent and framework for actions to be described in the implementation plans

While the strategy is focused on a short to medium time frame, with a long-term view incorporated, implementation plans are best developed for a shorter period, particularly if an adaptive management approach is to be implemented. In this regard, the strategy supports the development of implementation plans with a short-term implementation and review cycle, which reflects the use of annual performance plans in government. Of critical importance is the development of SMART targets in these plans, and an effective monitoring system that enables regular feedback to implementing organs of state so that they can reconsider their plans in order to improve delivery.

3.7 Systems-based Adaptive Management

The strategy should allow for adaptive response to changing circumstances and achievements based on effective on-going monitoring and evaluation, during its timeframe

As has been mentioned above, management of water quality in South Africa requires an adaptive management approach, in order to address the challenges in a complex socio-ecological system. Successful implementation of this strategy is based on the ability of the state, particularly at the catchment level, to implement a deliberate, systems-based, adaptive management approach. This approach must be inclusive, bringing together state, private sector and civil society players on a regular basis to review and adapt plans and actions.

Adaptive management enables the refinement of strategies and plans and the refocusing of financial and human resource allocation once certain actions have been implemented or certain milestones achieved, when the expected results from implemented actions are not achieved or when new information becomes available that informs improved approaches.

Adaptive management is based on the premise that actions should

- be appropriate to solving particular problems within their particular local contexts through
- creating a decision-making environment that encourages experimentation and courageous decisions so as to
- enable active, on-going, experiential and experimental learning amongst all stakeholders and an iterative feedback of lessons learned into the development of new solutions, while

- engaging a wide range of stakeholders to ensure that the necessary buy-in, partnerships and suite of actions are developed and that the programme is sustainable, legitimate, relevant and implementable.

An effective M&E system is critical for this to be achieved, particularly at the catchment level where the most substantive implementation of the strategy will take place. There are two elements to M&E that are important. The first is the M&E of raw water quality. The second is the M&E of the implementation of the strategy and accompanying plans. Since this strategy is in alignment with, and will, in due course, form part of the NWRS, the M&E system designed to monitor implantation of the NWRS should support M&E of this strategy as well. Information from both monitoring systems must be evaluated and fed back to decision-makers in a conscious process that allows for the reconsideration and changing of actions and responses.

In addition, it is critical that effective M&E in other relevant organs of state, including departments of agriculture, environment, minerals, health, and local government support the adaptive management approach.

4. THE WQM POLICY RESPONSE, VISION, MISSION AND GOALS

4.1 The Policy Response

Based on the situational analysis, the status quo of WQM is not encouraging and without a change in how we manage water, land use and development options, worsening water quality will continue to decrease the socio-economic benefits from and increase the costs associated with use of the country's water resources.

Historically, water quality management has been the mandate of the Department of Water and Sanitation alone, and yet there are many government departments whose mandates impact profoundly on water quality, most critically, the Departments of Environmental Affairs, Mineral Resources, Agriculture, Co-operative Government and Traditional Affairs, Health, National Treasury, Trade and Industry, their provincial counterparts where relevant, and municipalities. Therefore, the fundamental and new framing of the WQM Policy is that **integrated water quality management (IWQM) is a government-wide task, under the leadership of the Department of Water and Sanitation, with the private sector and civil society playing a key role, thereby calling for an** inclusive approach to managing water quality in the country.

The WQM Policy brought *together the best elements of existing, but fragmented, water quality management policy in the country,* as set out, for example, in the 1991 Water Quality Management Polices and Strategies (DWAF, 1991), the 2006 Resource Directed Management of Water Quality (DWAF, 2006), the draft policy on Mine-Water Management Policy (DWS, 2016f, in progress), and the principles of the National Water Resources Strategy -2. *It drew on international experience, to add new policy positions to the foundation provided by existing policy and crafted a new way forward for water quality management (WQM) in South Africa.*

In addition, the policy recognises that managing water quality is a complex problem. Contrary to historical views that relatively simple command and control approaches could be used to manage water quality, it is now recognised that in the water quality domain, both human and bio-physical systems interact. Both of these systems are, on their own, complex systems, and together, they are even more complex. There is no simple solution to dealing with complex problems, no one path that will lead straight to the correct future. In dealing with complex systems, the pathway is often affected by unexpected events and developments, calling for course corrections and new approaches (Figure 10). This policy, therefore, is firmly rooted in the recognition that th**e only way to manage the complex challenge of water quality is through adaptive management, a process that calls for flexibility, and for structured learning throughout the process in order to inform and amend policy and practice over time**. It is also rooted in the understanding that there are many different sets of knowledge that must be brought together to address the problem, be they social, political, earth sciences, financial analysis, or others. **Managing water quality requires us to bring together a wide range of knowledges in a structured process that allows co-learning, co-creation, and co-adaptation as we move forward.**

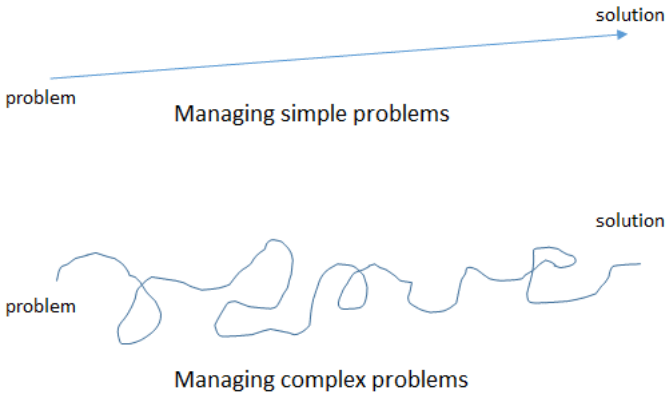

Figure 10: The different paths of managing simple and complex problems

The policy also provides for a **substantial shift in dealing with non-compliance** with water legislation, **setting out the need to adopt an approach of administrative penalties** to replace the current process of using the criminal justice system to impose penalties for non-compliance.

The WQM Policy was developed off the back of 15 Policy Principles, that were grouped into clusters relating to governance, economics and finance, operational matters and data and information. Principles 1, 3, 6, 8, 10, 11,12, 13 are those principles that are "new" principles, referring to the way in which they are applied to WQM. A detailed description of the WQM principles are presented in Appendix C.

Table 2: WQM Principles

GOVERNANCE	ECONOMIC AND FINANCE	OPERATIONAL	DATA AND INFORMATION
• **Principle 1:** Government-wide water quality management • **Principle 2:** Subsidiarity and accountability • **Principle 3:** Transboundary water quality management • **Principle 4:** Partnerships • **Principle 5:** Administrative fairness and implementability • **Principle 6:** Administrative Penalties	• **Principle 7:** Water quality is a developmental issue • **Principle 8:** Broadened funding mechanisms • **Principle 9:** Polluter pays	• **Principle 10:** An integrated and adaptive approach • **Principle 11:** Hierarchies of water use and pollution management decision-making • **Principle 12:** Green/ecological Infrastructure restoration and rehabilitation • **Principle 13:** Risk-based approach	• **Principle 14:** Collection and protection of data • **Principle 15:** Publicly available information

*The principles formed the foundation for the four, integrated policy responses (**Figure 11**):*

- **Inclusive water quality management:** This response deals with the need for an inter-departmental strategic, adaptive and systems-based response to the WQM challenges facing the country, some of the key policy aspects that must be addressed in achieving such an approach, as well as the need to build partnerships between government, civil society and the private sector in order to be able to successfully address the challenges.
- **Integrated, adaptive water quality regulation and management**: This response spells out the integrated, adaptive and systems-based approach to WQM, including the adoption of a risk-based approach and the application of a hierarchy of decision-making.
- **Financing integrated water quality management:** This response examines the financial underpinnings of IWQM, looking at tools for financing the required actions, as well as the role of the private sector in this regard.
- **Knowledge and information management:** This describes the policy with regard to the knowledge, human resource capacity and information base requirements to be able to implement the policy approaches.

Figure 11: The policy response

4.2 The Vision

The NWRS is clearly articulated as a strategy to give effect to the NDP and as such notes that a paradigm shift in sustainable resource development is needed in order to support inclusive growth. The NWRS provides a suite of seven themes that guide the water sector response, all supported by key enablers. Water quality, is articulated throughout the NWRS as a core element of the strategy, but the role of water quality is not fully distilled. To effectively address the management of water quality in support of the NDP and the NWRS, there is a real need to elevate water quality management and to clarify the instruments that will need to be used within the DWS and across sectors in an aligned, integrated and cooperative and manner.

The policy responses to the challenges laid out in the previous section, aim to support the vision for water management captured in the NWRS-2:

Sustainable, equitable and secure water for a better life and environment for all

In line with the above, the vision for water quality management in South Africa is to adopt:

"Government, in partnership with private sector and civil society, secure good water quality for all, forever"

4.3 The Mission

The mission to give effect to the WQM Vision are to:

vi. Support a consistent inter-departmental approach to how water quality is managed in the country.

vii. Support cooperative and integrated approaches to water quality management across sectors, including civil society.

viii. Adopt an adaptive management approach in which co-creation and co-learning by key players is entrenched.

ix. Realise improvements in water quality in key systems.

x. Start to build capacity for longer-term improvement in water quality

4.4 The Goals

In responding to the Vision and Mission for WQM, the IWQM strategy is based on five goals, which derive from the four response chapters of the IWQM policy

Figure 12: Policy Responses and Strategy Goals

The five goals are:

- ***Goal 1:*** *Aligned Policy, Strategy and Legislation*
- ***Goal 2:*** *Improved Governance*
- ***Goal 3:*** *Improved, Efficient and Effective WQM Practice*
- ***Goal 4:*** *Innovative Finance*
- ***Goal 5:*** *Improved Knowledge and Information Management*

4.5 The Values

The successful implementation of the Integrated Water Quality Management Policy is premised on the following values to achieve the vision, mission and goals for WQM:

Value system – justice, ethics, equity, integrity, fairness

Coherent action without a value system is at risk of floundering in the face of demands from competing sectors and the challenges of corruption. The Bill of Rights and the Constitution provide clear value-based principles for action in implementing the IWQM policy.

Courage

The courage to act decisively, to make mistakes and to learn, within a cycle of monitoring and review that is governed by a strategic adaptive management approach.

Communication and team work

Recognition of an interconnected water system of which water quality is a part, supports the needs for transparent communication and the ability to work as a team across all sectors of government and with the private sector and civil society.

Competence

There are many aspects to IWQM, including technical aspects and the need to manage complex systems, that require high levels of technical competence. The appointment of competent staff must be supported by capacity building programmes.

Empowerment

Officials are empowered to act (that is, to use their courage and competence) where there is effective leadership.

Informed civilians

Informed civilians are a key element of the effective delivery of integrated water quality management. The emergence of an informed civilian population requires investment in effective public information processes.

Responsibility

Responsible action emerges when there is competence, trust, and an active, shared, value system.

Listening and learning

Responsive implementation of the policy will require water quality managers to listen to water resource users and protectors, both individually and institutionally, and to be open to new learning and to be able to change approaches in the spirit of adaptive management

5. THE IWQM STRATEGIC RESPONSES

5.1 IWQM Strategic Issues

Once the Vision, Mission and Goals were developed, consideration was given to identifying the priority WQM issues and how to best address them. During the Assessment and Policy Phases, a large number of issues were identified (See Appendix A & B). These were collated into groups resulting in eleven Strategic Issue (SI) areas. These align with the WQM Goals as in **Figure 13.**

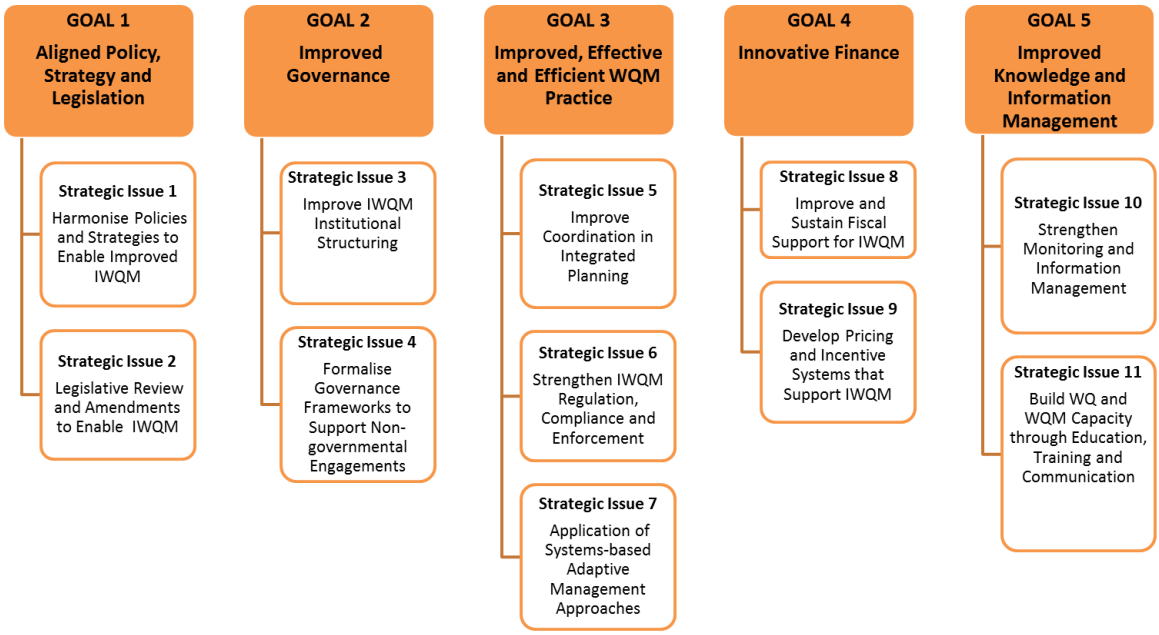

Figure 13: The Eleven Strategic Issues

The following section unpacks each of the strategic issues by:

- Outlining why it is a strategic issue;
- Presenting a summary table of Strategic Objectives and Strategic Actions that address the Strategic Issue; and
- Discussing the associated Strategic Objectives and Strategic Actions in more detail.

5.1.1 Strategic Issue 1: Harmonise Policies and Strategies to Enable Improved WQM

WHY IS IT A KEY STRATEGIC ISSUE?

Implementing effective IWQM requires a coherent approach across sectors, government departments and spheres of government. This coherent approach will also **increase the efficient use of limited resources**. Furthermore, ensuring that future sectoral policies and

strategies address both water quality and water quantity is crucial to **entrench IWQM as a government-wide challenge and to secure its sustainability** going forward.

Aligned and harmonised policy and strategy will also **enable improved cooperative governance** in relation to the authorisation of activities that impact on water quality and in terms of compliance monitoring and enforcement.

SUMMARY OF STRATEGIC OBJECTIVES AND ACTIONS

The table below gives a summary of the Strategic Objectives and Strategic Actions required to address Strategic Action 1.

Table 2: Strategic Objectives and Actions to address harmonisation of policies, strategies and legislation

STRATEGIC ISSUES	STRATEGIC OBJECTIVES	STRATEGIC ACTIONS
STRATEGIC ISSUE 1: Harmonization of Policies and Strategies to enable improved WQM	**SO1a**: Policies and Strategies impacting upon IWQM are harmonized	**SA1:** DWS to ensure that policy development and refinement within DWS addresses WQM
		SA2: Sector departments to harmonise policies and strategies to support IWQM
		SA3: DWS to finalise and implement non-point source pollution strategy

DISCUSSION

The IWQM Policy outlines the vision for WQM in South Africa and calls for an inclusive and integrated approach to managing water quality. While the Constitution, through Chapter 2 (the Bill of Rights) provides the imperative for protecting water quality, the regulatory responsibility is spread across the Department of Water and Sanitation, and the Departments of Environmental Affairs, Mineral Resources, Cooperative Government and Traditional Affairs, Rural Development and Land Reform, Agriculture, Forestry and Fisheries, as well as their provincial counterparts.

Historically, DWS has acted almost singularly (DEA has played a key role in terms of the EIA regulations) in terms of the management of water quality by setting policy, implementing the National Water Act (Act 36 of 1998), developing strategic plans, instruments, tools and guidelines, and by regulating water use. However, it is clear that our resources are under increasing pressure and that water quality is in decline in many catchments. This reflects the 'tragedy of the commons' scenario and without a fundamental shift in responsibility for this common-pool resource we are likely to see resource crashes in some of our key catchments.

With this in mind, there is a need for a more comprehensive governmental response to this growing threat, noting that the decline in resource quality requires the fuller responsibility of different sector departments and different spheres of government.

In order to give effect to this, a number of policies and strategies within relevant government departments and spheres of government must be refined, aligned or amended (SA2).

The alignment of the IWQM Policy and IWQM Strategy and relevant national, provincial and local policies and strategies also provides the opportunity for a coherent approach towards addressing the role of the private sector and civil society in IWQM.

Catchment Management Strategies, and internal DWS operational policies and strategies, as developed or amended over time will also need to be aligned both to the IWQM Policy and this Strategy.

The alignment of policy and strategies is needed to support a coherent IWQM programme across government. Policy and strategy coherence as the national level will drive similar coherence and integration at the provincial, catchment and local levels.

As part of the adaptive management approach outlined in the IWQM policy and in this strategy, relevant policies and strategies in government will need to be amended to address emerging concerns and to address lessons learned through the implementation process. In this light, DWS is currently undertaking a National Water Policy Review (NWPR) of the documents that underpin water legislation: The White Paper on Water Supply and Sanitation (1994), the White Paper on National Water Policy (1997), the White Paper on Basic Household Sanitation (2001) and the Strategic Framework for Water Services (2003). The Department is also in a process of developing a number of policies for Wetlands rehabilitation, Energy, Unconventional Gas Exploration, Mechanisms for Partnerships, Mine-Water Management, in collaboration with the DEA and DMR. Similarly, other Departments are in the process reviewing/updating their policies and strategies. In order to fully embed the WQM approach, all future policies and strategies need to take into account issues of water quality.

Non-point sources are a significant contributor to water pollution and need to be urgently addressed through an appropriate strategy. Whilst both the NWRS-1 and NWRS-2 alluded to the development of this strategy, little progress has been made. A national Non-Point Source Strategy (NPSS) for the management of non-point source pollution, including economic, regulatory and education / awareness mechanisms, and a decision support system for the implementation of the WDCS is a short-term priority (SA3). The NNPS should be reviewed regularly to improve the response going forward.

5.1.2 Strategic Issue 2: Legislative Review and Amendments

WHY IS IT A KEY STRATEGIC ISSUE?

In line with the Constitution, all relevant **government role players are required to develop and implement appropriate legislative** (and other) measures, and to operate in concert through formalised co-operative governance structures, **to protect water resources from pollution.**

Policies and strategies do not have the legal authority to hold polluters accountable and ensure the protection of water resources from pollution. While there are already several pieces of legislation that give government the mandate to manage water quality, there is a need to **amend the legislation** to enable the implementation of elements of this strategy,

such as those that apply to the administrative penalties approach and the promulgation of a Money Bill.

SUMMARY OF STRATEGIC OBJECTIVES AND ACTIONS

The table below gives a summary of the Strategic Objectives and Strategic Actions required to address Strategic Action 2.

Table 3: Strategic Objectives and Actions to address Legislative Review and Amendments

STRATEGIC ISSUES	STRATEGIC OBJECTIVES	STRATEGIC ACTIONS
STRATEGIC ISSUE 2: Legislative review and amendments to enable integrated WQM	**SO2a:** NWA/WSA effectively support integrated WQM	**SA4:** DWS to amend NWA and WSA to provide effective support to integrated WQM
		SA5: DWS to develop guidelines and protocols on the effective use of instruments
	SO2b: Other legislation effectively supports integrated WQM	**SA6:** National Treasury and DWS to promulgate a Money Bill for the Waste Discharge Levy
		SA7: DWS, DAFF, DMR and DEA to identify and amend relevant legislation to strengthen WQM

DISCUSSION

Amendment of legislation is a slow and onerous process, and the need to amend legislation is not taken lightly. Nonetheless, key amendments identified in the IWQM Policy need to be addressed to fully support and enable good IWQM, particularly amendments to the NWA to allow (SA4):

- Changes to the resource class of a resource;
- Declaration of protected water source areas;
- Categorisation of polluting industries, based on risk;
- Publication of a pollution register;
- Promulgation of a Money Bill for the Waste Discharge Levy (SA6); and
- Administrative penalties.

The necessary protocols and guidelines for the effective use of these instruments, as well as existing instruments in the NWA must be developed to enable officials in DWS and CMAs to apply them consistently and effectively (SA5).

The IWQM also notes that there has been insufficient consideration of water quality impacts in various sector laws such as CARA, NEMA, MPRDA, SPLUMA, particularly in relation to land use and spatial planning. To embed the inclusive, inter-departmental approach, identification of potential amendments to sector legislation is required in collaboration with the sector leaders (SA7).

5.1.3 Strategic Issue 3: Improve WQM Institutional Structuring

WHY IS IT A KEY STRATEGIC ISSUE?

The inter-departmental approach referred to in Strategic Issue 1 must be supported by **appropriate institutional arrangements**. This includes improving the internal systems and procedures for IWQM in relevant departments and organs of state, establishing effective interdepartmental co-ordinating structures and ensuring that regulatory bodies are effectively mandated and resourced to perform their IWQM functions.

This strategic objective aims firstly to **strengthen DWS and CMAs by ensuring that internal structures, capacity and systems are streamlined** towards effective and efficient management of water quality. Secondly, it aims to ensure that national, provincial and local government departments take responsibility for their roles in managing water quality and that **institutional structures are established to enable a co-ordinated response from government, and to support an effective governmental reporting framework**.

SUMMARY OF STRATEGIC OBJECTIVES AND ACTIONS

The table below gives a summary of the Strategic Objectives and Strategic Actions required to address Strategic Action 3.

Table 4: Strategic Objectives and Actions to Improve WQM Institutional Structuring

STRATEGIC ISSUES	STRATEGIC OBJECTIVES	STRATEGIC ACTIONS
STRATEGIC ISSUE 3: Improved WQM institutional structuring	**SO3a:** DWS departmental structures support integrated WQM	**SA8:** DWS to reconfigure the departmental WQM function as needed to ensure efficiency and effectiveness
		SA9: Develop the institutional protocols to enable DWS intervention in municipalities regarding discharges from failing WWT
	SO3b: Inter-sector departmental structures established to support integrated WQM	**SA10:** Establish intergovernmental WQM structures at trans-boundary basin, national and provincial levels to ensure coordination and joint action supported by regular reporting (link to activity on MoAs)
		SA11: Government departments to develop sector WQM plans and report annually on progress

DISCUSSION

As has been identified in the policy and in Strategic Issue 1, there is a need for improved water quality governance, including a more inclusive approach that brings to the table a

number of government departments and spheres of government. To this end, there is a need for the internal line functions within DWS to be reconfigured, where necessary, in order to ensure that departmental interventions are both efficient and effective and to enable integration or co-ordination with the relevant processes in other government departments, particularly DEA and DMR (SA8). The DWS has initiated a restructuring process in order to find improved structural mechanisms to implement legislation and policy. Once undertaken it will be important for the necessary protocols to be developed to guide operational processes, roles and responsibilities in order to attain the needed efficiencies and effectiveness (SA9). In so doing, it will also be imperative to unlock key processes that stalled previously. This includes such issues as the intervention of DWS where discharges from failing waste water treatment works are having significant impact upon a resource.

Noting that many challenges are multi-sectoral in nature, it is important for the DWS to work closely with sector departments and as well as representative organisations to develop structures that may operate at various scales (transboundary, national, catchment, local) to find cooperative and coordinated ways to manage water quality (SA10). This needs to be supported by plans that outline actions, roles and responsibilities, time-frames and resource requirements as well as a reporting system that yields an annual, integrated report on actions taken, progress against targets, and the state of water quality. (SA 11).

5.1.4 Strategic Issue 4: Formalise Governance Framework to Support Non-Governmental Engagements

WHY IS IT A KEY STRATEGIC ISSUE?

The increasing levels of impact and complexity in managing water quality requires more active engagement of stakeholders. Both local and international experience has shown that active **engagement and partnerships with the private sector and civil society** can substantially contribute to managing water quality. Engaging these players brings greater knowledge to the table, and engages a wider range of individuals and organisations that are able to support actions by government in water quality management. This enables cooperative and coordinated actions that reduce the burden on government for command and control style compliance. Supported by improved reporting systems these partnerships can enable timeous, efficient and effective response to water quality issues.

SUMMARY OF STRATEGIC OBJECTIVES AND ACTIONS

The table below gives a summary of the Strategic Objectives and Strategic Actions required to address Strategic Action 4.

Table 5: Strategic Objectives and Actions to Formalise Governance Framework to Support Non-Governmental Engagements

STRATEGIC ISSUES	STRATEGIC OBJECTIVES	STRATEGIC ACTIONS
STRATEGIC ISSUE 4: Formalise governance frameworks to support non-governmental engagements	**SO4a:** Partnerships/stewardships established and maintained	**SA12:** DWS to develop a partnership framework that is fair and equitable
		SA13: DWS to develop and foster strategic sector partnerships
	SO4b: Governance framework for active citizenry formalized	**SA14:** DWS with DEA and CMAs to develop an engagement framework that enables more active participation of civil society at transboundary, national and catchment levels
		SA15: DWS, DEA and CMAs to support and drive functional platforms for the engagement of civil society nationally and within catchments

DISCUSSION

The private sector and civil society need to be understood as strategic partners in the strategy to strengthen WQM. In recent years, there has been a growing recognition of the role that the private sector can play through partnerships, voluntary regulation and stewardship approaches. This has been evidenced by the work of the United Nations CEO Mandate, the Alliance for Water Stewardship, and others. Already in South Africa, there is a strong tradition of engagement of several large private enterprises on water issues. However, often the engagement of the private sector has been of a lobbying and advocacy nature with government acting as policy maker and regulator.

This strategy takes this discourse towards one of ensuring the principle of sustainable water use is mainstreamed into the business practices of the private sector. When this is linked to key corporate risk areas this becomes of increasing significance to business. This understanding of the goods and services that the private sector accrue from water resources and the broader environment will assist in shifting the private sector to play stronger stewardship roles in catchments.

This will require the development of a partnership framework that will assist in the structuring and development of these partnership arrangements (SA12). DWS will continue to foster these partnerships through initiatives such as the Strategic Partners for Water Network and the uMngeni Ecological Infrastructure Partners (SA 13).

The role of civil society is different in that civil society organisations often play a key watch-dog and advocacy role. As such, civil society often holds government and the private sector to account. This is a critical role and DWS, together with the various government departments that partner the water sector, will continue to support the active engagement of civil society through a variety of platforms such as the Water Sector Leadership Group, various working groups and catchment management forums (SA 15). This engagement with

civil society will take place in line with a framework developed by DWS, DEA and CMAs, through a consultative process with civil society (SA 14).

5.1.5 Strategic Issue 5: Improve Coordination in Integrated Planning

WHY IS IT A KEY STRATEGIC ISSUE?

The lack of integrated, inter-departmental planning has significant impacts on water quality as different departments and spheres of government engage in and support development activities with potentially significant impacts on water quality, particularly from changes to land-use. **Pro-active and integrated planning** to timeously address future water resource challenges is essential to maintaining water security. In those catchments that are highly developed due to urbanisation, industrialisation or intensive irrigation, water quality planning becomes even more critical with a need for **integrated plans that will address the specific water quality issues in those catchments**. Such plans can inform appropriate responses from a range of government, private sector and civil society actors.

The catchment is at the 'coal-face' for IWQM and integrated, coordinated planning ensures the effective use of resources (human and financial) in managing water quality.

SUMMARY OF STRATEGIC OBJECTIVES AND ACTIONS

The table below gives a summary of the Strategic Objectives and Strategic Actions required to address Strategic Action 5.

Table 6: Strategic Objectives and Actions to Improve Coordination in Integrated Planning

STRATEGIC ISSUES	STRATEGIC OBJECTIVES	STRATEGIC ACTIONS
STRATEGIC ISSUE 5: Improved coordination in integrated planning	**SO5a:** Integrated sectoral planning approach is adopted at transboundary and national level	**SA 16:** DWS to lead the development of an IWQM plan for national priority catchments, ensuring consideration of transboundary WQ concerns
		SA 17: DWS, with NT, SALGA and COGTA to develop a strategic action plan for the rehabilitation and upgrade of prioritized WWTWs
		SA18: DWS to work with DMR and DEA to develop a strategic action plan for the implementation of the mine-water management policy
		SA 19: DWS/DAFF/DMR/DEA/DRDLR/COGTA to development strategic action plan to reduce non-point source pollution
		SA 20: DWS, DEA, SALGA and COGTA to develop a protocol for the management of industrial discharge within the municipal environment

	SO5b: Integrated sectoral planning approach adopted in catchment/regional plans	**SA 21:** CMAs to develop an IWQM plan for each water management area as part of the CMS
		SA 22: DWS, DEA and DMR to integrate IWQM and water resource planning with Regional Mining Plans in priority areas
		SA 23: DWS and COGTA to ensure that WSDPs, IDPs and SDFs reflect WQM priorities and management responses

DISCUSSION

Water quality challenges manifest differently across the country, and have different geographical footprints. While some water quality issues are of national importance, others have more localised impacts. The former requires intervention and support from the national level, while the latter require more localise management responses. Of national importance are issues such as:

- Addressing water quality in national priority catchments, including those with significant transboundary WQ concerns;
- The rehabilitation and upgrading of WWTWs in prioritised areas;
- Resolving mining related pollution challenges
- Finding effective solutions to non-point source pollution; and
- Finding effective solutions to the management of industrial discharge within the municipal environment.

In addition to the national response, however, integrated approaches as the catchment level are also critical. CMAs have the responsibility to develop and implement catchment management strategies (CMS) that are consistent with the NWRS2. The CMS will enable the alignment of various sectoral plans, including Regional Mining Plans, Spatial Development Plans, and municipal IDPs, to support sustainable water quality management. CMAs, though the CMS, will be central actors in embedding an IWQM approach in each water management area.

There are concerns that the complexity of integrated planning and the capacity needed to implement the results have outstripped the ability of the country to deliver. In this regard, the role of institutional engagement platforms (SI 4) and programmes for the development of capacity (SI 11) are important.

There are a number of government departments across all three spheres of government that support development activities that have potential impacts on water quality, be they urban development, mining, industrial development, changes in run-off through construction of roads and increases in impermeable surfaces, or changes in agricultural practice. Changes to land-use, in particular, may result in diffuse source pollution but do not require water use authorisation unless an EIA is required. Proactive interdepartmental planning that considers

the water quality impacts of potential development scenarios within a catchment can assist in managing water quality while still supporting the development required to meet the socio-economic requirements of the country. In some catchments, water quality is sufficiently bad that plans need to address how to reduce the existing pollution and to restore water quality. In these catchments, which are considered national priorities, DWS, with CMAs, will drive an inclusive and consultative process to develop an integrated water quality management plan for the catchment (SA 16). In areas in which pollution from mining is an issue, DWS, DEA and DMR will ensure that the IWQM plans and the Regional Mining Plans are integrated and that a common approach from government is ensured that will protect water quality from the impacts of mining (SA 22). In other catchments, CMAs will develop IWQMPs as part of the CMS (SA 21).

A major challenge that affects water quality across the country is the pollution derived from poorly managed or failing WWTW. This challenge has been widely recognised, and plans are already in place for addressing some of the challenges. To take this work forward, DWS, with NT, SALGA, CMAs and COGTA will develop a strategic action plan for the rehabilitation and upgrade of prioritized WWTWs (SA 17). DWS, DEA, SALGA and COGTA will also develop a protocol for the management of industrial discharge within the municipal environment (SA 20), since this is a contributing factor to water pollution from urban areas and to the challenges municipalities face in treating urban waste water. In addition, DWS and COGTA will ensure that WSDPs, IDPs and SDFs reflect WQM priorities and management responses (SA 23).

Non-point source pollution remains a significant challenge in managing water quality, with pollution from agricultural land, mining, and urban settlements posing particular challenges. DWS, with CMAs, DAFF, DEA, SALGA and DMR, will develop a strategic action plan for managing non-point source pollution, which will include the roles and responsibilities of the various departments in reducing non-point source pollution within their spheres of control (SA 19). A significant part of the non-point source pollution challenge in specific catchments is pollution from existing and closed mines, with the potential pollution from new mines as an additional challenge. While considerable work has been done on the issue of mining pollution, and effective strategy has not yet been finalised and implemented, and this remains a serious challenge in a number of catchments. To address this, DWS will lead a process with DMR and DEA to develop a strategic action plan to support the implementation of the mine-water management policy which will include annual reporting on progress against agreed targets (SA 18).

5.1.6 Strategic Issue 6: Strengthen IWQM Regulation, Compliance and Enforcement

WHY IS IT A KEY STRATEGIC ISSUE?

Poorly managed discharges into water resources have significant impacts on aquatic ecosystem and human health and water use more generally. The socio-economic impacts can be severe. Weak compliance monitoring and enforcement is currently enabling polluters

to remain unchecked, and for water users not to meet the conditions of their water use licences. Often, the conditions under which authorisations are given change and appropriate management or treatment is not sufficiently applied prior to discharge. This is exacerbated by an increasing non-point source pollution (see SI 1) as a result of poor or uncontrolled land use management practices. **A consolidated approach to strengthen regulation and enforcement** is critically important in ensuring that we protect water quality with the most effective use of limited state resources. It is also important that the key organs of state responsible for water quality management are capacitated and able to operate efficiently. This requires that **CMAs are established and delegated appropriate water management functions** over and above their inherent functions. The resources of the **private sector and civil society** can assist also government in building effective regulatory, compliance monitoring and enforcement mechanisms.

While there is a need to develop a more rigorous and integrated command and control approach to the enforcement of authorisations, there is also a need to develop partnerships across sectors and between users to develop improved approaches that incentivise lawful and sustainable water use.

SUMMARY OF STRATEGIC OBJECTIVES AND ACTIONS

The table below gives a summary of the Strategic Objectives and Strategic Actions required to address Strategic Action 6.

Table 7: Strategic Objectives and Actions to Strengthen IWQM Regulation, Compliance and Enforcement

STRATEGIC ISSUES	STRATEGIC OBJECTIVES	STRATEGIC ACTIONS
STRATEGIC ISSUE 6: Strengthen IWQM Regulation, Compliance and Enforcement	**SO6a:** Licencing processes streamlined	**SA 24:** DWS to address the backlog of WUL applications urgently and to meet stipulated timeframes for new licence applications
		SA 25: DWS, DEA to develop risk-based protocols for determining water use authorization
		SA 26: DWS/CMAs to develop protocols for CMA engagement in IWUL applications and approval processes
		SA 27: DWS, DEA, DAFF and DMR to develop and implement a protocol for integrated licensing processes
		SA 28: DWS, DEA, DAFF and DMR to develop information management systems to support the integrated licensing approach
	SO6b: Targeted/strengthened compliance monitoring and enforcement of key polluting	**SA 29:** DWS, DEA to develop improved regulatory approaches to manage WQ pollution from land-based activities

sectors	**SA 30:** DWS, DEA, CMAs to develop a targeted approach for the enforcement of regulation
	SA 31: DWS, DEA to assess gaps in regulatory frameworks and instruments and develop revised approaches and instruments as necessary
	SA 32: DWS, DEA, CMAs to develop systems for joint CME

DISCUSSION

Whilst there is a need to establish a more cooperative institutional environment to enable improved WQM, there is still an important need to strengthen the manner in which water use is regulated. Where water resources are more abundantly available, or where water use has lower levels of impact, there can be an argument for less stringent compliance with regulatory instruments. The pressure that is being placed upon the water resources of South Africa is creating increased complexities in ensuring that adequate quantities of water, of suitable quality for use, is reliably available. Noting that the levels of unlawful water use and non-adherence to water use license conditions does require redress, a structured approach is required to improve compliance monitoring and enforcement. Whilst this does still require the command and control approach, the use of other innovative mechanisms for incentivising compliance does need to be explored (see SI 9).

The DWS is already taking significant steps to improve capacity in this regard and has been working closely with DEA to train more staff as Environmental Management Inspectors (EMIs). However, it is important that other government departments (SI 3) also improve their regulatory approaches. In some instances, there are benefits to be achieved from government departments acting conjunctively and partnerships between DWS, DEA, DMR and DAFF are deemed as strategically important.

This will require an array of actions that include strengthening our understanding and implementation of the WQM hierarchical and differentiated approaches, continuing to work on the back-log of license applications and to ensure that new licences are resolved within agreed timeframes (SA 24), developing risk-based protocols for water use authorisation (SA 25) that also set out the roles and responsibilities of CMAs in water use authorisation (SA 26), developing and implementing an integrated licensing protocol (SA 27) as well as the information management systems required to support this integrated licencing approach (SA 28).

In addition, improved regulatory mechanisms will be developed which will support:

- Improved regulation of pollution from land-based activities, in line with the NPS strategy that will be developed (SI 5)
- A targeted approach to regulation that enables government to focus limited resources on high-risk/high impact activities
- Systems for integrated CM&E mechanisms within government.

5.1.7 Strategic Issue 7: Application of Adaptive Management Approaches

WHY IS IT A KEY STRATEGIC ISSUE?

There are a wide range of forces at play in a catchment, from the bio-physical, such as rainfall, temperature, wind, and vegetation, to the socio-economic, such as population trends, economic development trends, and the nature of socio-economic development pathways. All of these impact on water resources in subtle or not-so-subtle ways. Some of these forces may have complex patterns of interactions and cumulative impacts. The result is a complex system, in which particular actions or changes may not have linear, or even expected results. and management of complex systems is always a challenge, and considerable work has been done globally in recent years on how to manage complex systems. The widely recognized best practice is the implementation of adaptive management, and in the case of catchment management, adaptive management that recognizes the systemic nature of the catchment, giving rise to systems-based adaptive management.

Systems thinking recognizes that a system is driven by the inter-relationships and interactions of its various parts, with the potential for positive and negative feedback loops in these interactions. Thus, impacting on one part of the system may have a range of impacts on other parts of the system that are difficult to predict. Adaptive management recognizes this challenge, and brings to bear a management system that enables on-going course-correction through structured monitoring and learning from the results of actions taken.

Systems-based adaptive management is an imperative for managing water quality, supported by **information and knowledge networks that provide the evidence base for decision-making.**

SUMMARY OF STRATEGIC OBJECTIVES AND ACTIONS

The table below gives a summary of the Strategic Objectives and Strategic Actions required to address Strategic Action 7.

Table 8: Strategic Objectives and Actions to Address Application of Adaptive Management Approaches

STRATEGIC ISSUES	STRATEGIC OBJECTIVES	STRATEGIC ACTIONS
STRATEGIC ISSUE 7: Application of Systems-based Adaptive Management Approaches	**SO7a:** Adaptive systems-based management is applied at catchment level	**SA 33:** CMAs to develop localised programmatic monitoring and reporting of actions and outcomes
		SA 34: CMAs to lead process with other relevant government departments and agencies, and stakeholders, to review, identify and address priority WQ challenges at regular intervals
		SA 35: DWS with DEA and CMAs to develop protocols for systems-based adaptive management for IWQM.

DISCUSSION

There is an increasing recognition of the fact that catchments are complex systems and require management approaches that are appropriate to this complexity, as in adaptive management. In addition, this adaptive management takes place within a complex socio-ecological system, giving rise to the need for systems-based adaptive management (SBAM). There are a number of aspects to developing an effective SBAM approach, including the need for the development of a common vision amongst government, private sector and civil society players at the catchment level, through the IWQM plans (SI 5). In addition, a suite of supporting instruments that enable the adaptive approach is needed, including:

- **Willingness**: Those responsible for the management of the resource need to have the vision and intent to undertake processes step for step and to willingly adapt to developing circumstances. CMAs will lead a process at the catchment level to develop a common vision for managing water quality at the catchment level and to build the necessary commitment by relevant players to realise the vision. Based on this, the CMA will lead an inclusive process to review, identify and address priority WQ challenges at regular intervals, within an adaptive management approach (SA 34)
- **Enabling environment**: The policy and strategic environment needs to support the need to make adaptive responses. These are policies that recognize the importance of integration between sectors (horizontally) and between scales (vertical). This is also supported by an enabling institutional environment where adaptive decisions are enabled.
- **Information and knowledge**: Adaptive management responses need to be based upon information and knowledge triggers that inform the need to adjust. This needs to be supported by learning systems that enable stakeholders to engage and own decisions. CMAs have a critical role in developing programmatic monitoring and reporting of actions at outcomes at the catchment level to support SBAM (SA 33) and to develop the protocols for SBAM, including how monitoring, the assessment of knew knowledge, and learning take place and inform decision making (SA 35).
- **Institutions**: Localised and catchment based institutions, at various scales, that are responsible for water resources management are able to respond more efficiently and effectively to changing circumstances. Some degree of self-organisation is needed to ensure that these institutions are supportive of the context.

Therefore, there is a need to provide support and guidance that develops the protocols for localized programmatic monitoring and reporting of outcomes to enable adaptive responses.

5.1.8 Strategic Issue 8: Improve and Sustain Fiscal Support for IWQM

WHY IS IT A KEY STRATEGIC ISSUE?

Improving our resource water quality to achieve positive impacts on economic growth as well as human and ecological health r**equires reliable, sufficient and sustained financing**. Currently the government budget allocation is currently insufficient to address all water quality issues and alternative sources of funding are required to take on the task, particularly in the context of limited fiscal resources. In addition, it is important to be able to understand what the real costs of managing water quality should be and what **investment is required** over the next ten years in order to be able to management water quality effectively and to find the necessary sources of funding to meet the investment needs. Funding of water quality management initiatives is not limited to DWS and includes other relevant government departments and public entities. Inter-departmental **co-operation will ensure greater impact from fiscal allocations for IWQM** across the suite of relevant departments**.**

SUMMARY OF STRATEGIC OBJECTIVES AND ACTIONS

The table below gives a summary of the Strategic Objectives and Strategic Actions required to address Strategic Action 8.

Table 9: Strategic Objectives and Actions to Improve and Sustain Fiscal Support for IWQM

STRATEGIC ISSUES	STRATEGIC OBJECTIVES	STRATEGIC ACTIONS
STRATEGIC ISSUE 8: Fiscal support for integrated WQM	**SO8a:** WQM interventions are financially supported by the fiscus	**SA 36:** WRC to support research into the socio-economic-environmental and management costs of poor WQ
		SA 37: DWS to develop an investment framework including innovative mechanisms to mobilise funding for sustained support to IWQM
		SA 38: DWS, with NT, COGTA, SALGA, to review municipal conditional grants
		SA 39: DWS to develop and implement a protocol for extending the financial provisioning clause to all industries that are deemed "high-risk" polluters.

DISCUSSION

The mechanisms for funding IWQM will need to be revised to address the significant impacts of declining water quality. Some of the funding-related challenges are:

- inadequate funding raised through the regulatory mechanisms available to DWS due, for instance, to delayed implementation of the Waste Discharge Charge Strategy (WDCS);

- the lack of sustainable financial models for local government, leading to inadequate funds to maintain Waste Water Treatment Works;
- inadequate implementation of environmental provisions related to mine rehabilitation;
- poor co-ordination and planning across the sector and spheres of government;
- insufficient skills and capacity for WQM in government;
- establishing and capacitating of the CMAs to develop CMSs and IWQMP;
- poor cooperative governance frameworks and interventions; and
- economic policy uncertainties and anomalies as well as the generally uncertain political climate, which have resulted in inadequate investment by private sector companies in WQM.

Funding is required not only for regulatory activities such as water use authorisation, compliance monitoring and enforcement, but also for research on emerging pollutants, on-going training and capacity building, staffing, stakeholder engagement, public awareness, information dissemination and sharing, WQM systems development, rehabilitation of degraded areas and in some cases, the construction and management of water and wastewater treatment facilities and the construction and rehabilitation of green infrastructure.

As water quality challenges increase as a result of increasing population and economic development, the funding requirements will also increase. The mechanisms for funding water quality management will need to be revised to address these changes. In this light, it is crucial that this framework is updated annually, to reflect the progress made in improving water quality, supporting/enabling WQM. This annual reflection allows for the adaption of the investment framework to allocate and align resources to WQ and WQM issues of strategic importance.

Water pollution has direct, but insufficiently recognised, impacts on economic growth, human health, ecosystems, job creation and the cost of doing business. The financial resources currently available for managing water quality are insufficient for the task, and do not recognise the level of investment that is required to counteract the economic harm done by declining water quality. These economic and environmental impacts need to be quantified in order to understand the return on investment on the use of state funds to manage water quality, not least in order to be able to motivate for greater resource allocation (SA 36). In addition, it is important to be able to quantify the investment in water quality management (infrastructure and management responses) over the next ten years in order to be able to mobilise the necessary funding (SA 37). This investment framework will expand the current investment framework for water supply developed by DWS. In developing the IWQM Investment Framework, new approaches may be required such as ring-fencing of funds specifically for IWQM, or these establishment of a CMA trust fund. These innovative mechanisms may pave the way for increased donor, NGO or private sector contributions for localised interventions.

The funding for addressing mine water challenges remains an on-going challenge, with a combination of state and private sector funds required to address the challenge. While NEMA and the NWA allow for financial provisions for managing the water impacts of mining after closure, as of now, the NEMA related funding is insufficient to address the on-going water quality challenges from closed mines, and the NWA facility to require financial provisions has not been utilized. Protocols and financial mechanisms are required in to support the of expanding the financial provision to other high-risk polluters, who are not from the mining industry and the use of the NWA provision for the mining industry (SSA 39). It should be noted that access to the current financial provision made by mines for the rehabilitation of polluted areas, both land and water, has proven to be very difficult. Protocols and mechanisms to unlock this is also required.

Revision of WUL application fees to reflect the complexity of the application should also be undertaken to ensure that the revenue from WUL application fees serves to cover the costs of reviewing the WUL application.

Municipal discharge is a significant challenge for WQM in South Africa and the sustained maintenance and rehabilitation of failing municipal WWTWs is a critical step in turning this around. The current system of municipal grants is incentivising a build-operate-decay-rebuild approach, with insufficient funding being made available for proactive maintenance programmes in many municipalities. A review of the municipal conditional grants and municipal budgets for the rehabilitation and effective operation and maintenance of WWTWs is required by DWS COGTA, and NT (SA 38).

5.1.9 Strategic Issue 9: Develop Pricing and Incentive Mechanisms that Support IWQM

WHY IS IT A KEY STRATEGIC ISSUE?

Appropriate pricing and economic incentives have been shown, globally, to result in **behavioural change while also raising revenue** for water management interventions. Government is highly resource constrained and innovative financing mechanisms can increase the financial resources available for integrated water quality management.

SUMMARY OF STRATEGIC OBJECTIVES AND ACTIONS

The table below gives a summary of the Strategic Objectives and Strategic Actions required to address Strategic Action 9.

Table 10: Strategic Objectives and Actions to Develop Pricing and Incentive Mechanisms that Support IWQM

STRATEGIC ISSUES	STRATEGIC OBJECTIVES	STRATEGIC ACTIONS
STRATEGIC ISSUE 9: Develop pricing and incentives that support integrated WQM	**SO9a:** The Waste Discharge Charge System is implemented	**SA 40:** DWS, with CMAs, to implement the WDCS in priority catchments
		SA 41: DWS, with CMAs, to develop an action plan to support the phased implementation of the WDCS across the country
	SO9b: Mechanisms for incentivising good practice developed	**SA 42:** DWS/DEA/WRC to explore innovative financing mechanisms for incentivising good IWQM practice
		SA 43: DWS and NT to determine financial incentives for water-reuse (AMD, other)
		SA 44: DWS/DEA to develop the legal and institutional mechanisms for introducing administrative penalties for environmental non-compliance including water pollution.

DISCUSSION

The implementation of the WDCS in key priorities catchments is urgently required since it has the ability to not change behaviour, but also raise revenue to initiate real change in critical catchments. Implementation should take place in priority catchments as a matter of urgency (SA 40) with a roll-out over time to all catchments (SA 41). This economic instrument, which adopts the “polluter pays” principle is aimed at changing polluter behaviour while also raising revenue for IWQM. The development of the WDCS has taken over a decade to reach implementation readiness, and implementation is now overdue and will be prioritised.

Another area identified for the use of economic instruments to reduce pollution is around the re-use and sale of treated water. This primarily speaks to mine water, and is being address as part of the Mine-Water Management Policy (SA 43).

In addition to these economic incentives, it is important to look to the development of further economic incentives, based either on local knowledge or global best practice (SA 42).

The introduction of administrative penalties is a financial penalty system aimed at driving a reduction in pollution and improved adherence to regulatory requirements. While the primary aim of the administrative penalty system is to impose sanctions on illegal actions, the finances derived from administrative penalties can also be used to reduce pollution in the catchment. Significant legislative requirements and institutional arrangements to support these introduction of administrative penalties are required. Currently, the DEA together with CER is investigating the feasibility of this and DWS will work with them to ensure the introduction of an effective administrative penalty system for water quality (SA 44).

In addition, partnering with other institutions in the financing of grey and green infrastructure, and in improved IWQM, will broaden the funding streams available. For example:

- SANBI's ecological infrastructure directorate funds ecological infrastructure that is critical for IWQM; and
- There is potential to access funds from funds focused on climate change adaptation and the SDGs.

Once again, it will be important to develop the relevant governance and financial frameworks to support these innovative finance mechanisms.

The implementation and operation of collaborative action poses specific challenges and risks to government, municipalities and private sector in terms of its credibility, security, quality and management of risk. Collaboration must be done within the spirit of sharing risks and benefits, through good cooperative governance, management and implementation between all partners. While various institutional models may be developed by government or the private sector (e.g. mining companies in the catchment) to provide this function, an autonomous statutory committee housed by a public entity may provide particular advantages in ensuring independence and stakeholder acceptability, maintaining quality and managing risk. The Strategic Water Partners Network (SWPN) has developed a business case for the establishment of a Mine Water Coordinating Body in the Witbank Coalfields to assist with the facilitation, coordination and management of mine water in the area. These types of initiatives should be considered for roll-out.

In addition, clean technology supported by green economy initiatives and financing mechanisms provides targeted ways of reducing pollution at source. The private sector has a crucial role to play in minimising its impacts on water resources. Collaborative efforts by the private sector and international funding organisations (such as the World Bank) and/or NGOs (such as WWF) illustrate that by sharing water risks, benefits can also be shared. There is therefore a recognition that business risk associated with physical, reputational and/or regulatory impacts has contributed to collective action initiatives associated with new emerging partnerships. This, however, requires an enabling environment for research and development and the promotion on the clean technology industry.

5.1.10 Strategic Issue 10: Strengthen Monitoring Networks and Information Management

WHY IS IT A KEY STRATEGIC ISSUE?

It is not possible to manage what you don't measure. Good water quality **monitoring enables effective enforcement and compliance**. Added to this, the timely sharing of data and information allows the development of relevant and applicable WQM interventions, which have a high likelihood to succeed. Updating of the monitoring network and monitoring services (such as online monitoring) enables effective enforcement and compliance of laws and regulation and supports the systems-based adaptive management approach.

SUMMARY OF STRATEGIC OBJECTIVES AND ACTIONS

The table below gives a summary of the Strategic Objectives and Strategic Actions required to address Strategic Action 10.

Table 11: Strategic Objectives and Actions to Strengthen Monitoring Networks and Information Management

STRATEGIC ISSUES	STRATEGIC OBJECTIVES	STRATEGIC ACTIONS
STRATEGIC ISSUE 10: Strengthen Monitoring and Information Management	**SO10a:** An integrated and functioning WQ monitoring network	**SA 45:** DWS/CMAs to strengthen national and catchment WQ monitoring networks through spatial expansion and identification of priority constituents for catchment-specific monitoring
	SO10b: Information systems that are current and accessible to support adaptive WQM	**SA 46:** DWS, with the WRC and CMAs, to lead the development of a programme to create and support citizen-based monitoring programmes
		SA 47: DWS/DEA/CMAs to ensure the harmonisation of data and information systems pertaining to WQ
		SA 48: DWS, CMAs, DEA, DAFF, DMR to develop systems to enable data and information access by stakeholders/public
	SO10c: Routine assessments inform adaptive WQM	**SA 49:** DWS/DEA/CMAs to develop protocols and systems to ensure M&E and new information inform adaptive management decisions for IWQM

DISCUSSION

The main function of a water quality monitoring programme is to produce the information, based on the analysis of data, that supports appropriate water management decisions. The social, legal, ecological and financial implications of making incorrect decisions as a result of unreliable, inaccessible or non-existent data or information is significant. The adaptive management approach, adopted in this strategy, is highly dependent on current, scientifically sourced and legally defensible data and information in order to inform changes to the management approach over time. The information systems to support the management and sharing of information.

South Africa has programmes in place to monitor water quality across the country, however, such monitoring is constrained by limited financial resources, insufficient monitoring stations, inadequate numbers of suitably skilled staff, uneven availability of access to accredited laboratories for testing of samples, and the complexity of monitoring the number and variety of pollutants entering water resources, including new and emerging pollutants. There is thus a need to expand the coverage of both raw water and wastewater quality data monitoring to enable an integrated approach that will ensure optimal evaluation of water quality across the country, identifying what is required for a national monitoring network and what for catchment

level management, and aligning the systems of different organs of state, such as DWS, DEA and CMAs (SA 45, 47).

Whilst the ability to generate data from these monitoring networks is an important, the management of such data once generated also needs to be addressed. The conversion of the data into useful information, through analysis and assessment, that is available and accessible to different parts of the public is also crucial to support the capacity, both within and outside government (SA 48). Equally important is developing the necessary systems and protocols to ensure that the information from monitoring programmes, and new and relevant information, feed into the decision-making process to ensure adaptive management is implemented (SA 49).

In addition, with the expansion of ICT accessibility, huge strides have been made around citizen-based monitoring and science in the water sector. The smart-phone enabled mini-SASS app developed in South Africa is an excellent example of what is possible. The development of citizen-based monitoring programmes can contribute significantly to data and information on water quality across the country, and DWS and the WRC have a leading role to play in this regard (SA 46).

5.1.11 Strategic Issue 11: Build WQ and WQM Capacity through Education, Training and Communications

WHY IS IT A KEY STRATEGIC ISSUE?

Capacity building is fundamentally about improving effectiveness, often at the organisational level. To this end, this priority area is to strengthen the approach of DWS and its sector partners ensuring that internal structures, capacity and systems are improved and aligned towards the effective and efficient management of water quality. Equally important is that national, provincial and local government departments take responsibility for their roles in managing water quality and to this end institutional structures should be established to enable interaction and integration, as well as support the development of a governmental reporting framework.

It should be noted that even though developing countries are, traditionally, less likely to have the institutional, technical or financial capacity to undertake many water resource management activities, several developing and developed countries have illustrated how innovation, through research and development, can help conquer traditional barriers.

The building and maintaining of WQM capacity in DWS and its sector partners, including civil society, through education, training, research and communication is crucial in supporting the inclusive approach towards ensuring effective water quality management.

SUMMARY OF STRATEGIC OBJECTIVES AND ACTIONS

The table below gives a summary of the Strategic Objectives and Strategic Actions required to address Strategic Action 11.

Table 12: Strategic Objectives and Actions to Build WQ and WQM Capacity through Education, Training and Communications

STRATEGIC ISSUES	STRATEGIC OBJECTIVES	STRATEGIC ACTIONS
STRATEGIC ISSUE 11: Build WQ and WQM Capacity through Education, Training and Communication	**SO11a:** Sustained capacity for Government /CMA/sector to effectively manage and support WQM through improved education and training	**SA 50:** DWS/WRC to develop and implement a capacity building programme for officials in DWS, CMA and other sector departments in systems-based, adaptive IWQM
		SA 51: DWS/CMAs to expand capacity-building initiatives to civil society and private sector
		SA 52: DWS to develop regulations to ensure the professionalization of key water services functions
		SA 53: DWS/private sector to providing bursaries/learnerships pertaining to WQM at tertiary institutions
	SO11b: WQM decisions are underpinned by best practice, research and innovation	**SA 54:** DWS, with the WRC, to investigate the options provided by recent innovative developments to improve water quality
		SA 55: WRC to lead the sector in innovation, research and development for IWQM
	SO11c: A well informed and actively engaged South Africa	**SA 56:** DWS to report annually on the state of WQ in the country
		SA 57: DWS/WRC to develop online tools for easy access to WQ and WQM related information
		SA 58: DWS/DEA/DAFF/DMR/CMAs to develop and maintain multi-sector stakeholder platforms for sharing information

DISCUSSION

The lack of technically skilled and experienced staff in water quality and water quality management in all spheres of government has significantly contributed to the decline of the country's resources, mainly from weaknesses in authorisation of waste discharges by DWS, gaps in water quality and compliance monitoring and failure to take effective action against polluters, and poor management of WWTW. Whilst there is a myriad of tools that speak to the different aspects of management of water quality, a consolidated approach and the inter-linkages between functions is not well understood or supported. It is critical to act swiftly to build capacity through training, professionalization of staff in key areas (SA 52) and to adopt a longer-term vision for sustaining and ramping up capacity to manage increasing water quality challenges in future (SA 50). It is also extremely important to build the capacity of civil society and the private sector (particularly smaller companies with significant water quality

impacts) to enable them to play a fuller role in the monitoring and management of water quality across the country (SA 51).

The provision of bursaries and scholarships for studying water quality management at tertiary institutions is also critical (SA 53).

Access to the data and information on water quality and its management is crucial, however, without the knowledge and experience to effectively utilise the information through sustained capacity development initiatives, the effort is futile. In this light, developing and maintaining WQM capacity needs to be fast tracked for an improved governmental response, and ensuring that there are active, informed and engaged citizens to support the process.

On-going research, innovation and development is needed to ensure that the most effective tools and approaches are being used for managing water quality across the country. It is also critical to ensure that this information and knowledge is conveyed to the relevant policy makers and implementers in a manner that supports the introduction of new tools, technologies and systems in an effective and sustainable manner (SA 54, 55).

DWS, with the WRC, will develop the necessary systems to ensure easy access to WQ and WQM related information on line (SA 57).

Finally, reporting on water quality trends and progress against targets is a critical element of this strategy, and DWS will report annually, to Parliament, on the state of raw water quality in the country, and on progress against targets by all relevant government departments, as well as on the role played by the private sector and civil society (SA 56).

A summary of the Strategic Objections and Actions are presented in **Appendix D.**

6. TOWARDS IMPLEMENTATION

Implementation is the process that turns strategies into action plans and activities in order to accomplish strategic objectives and goals. As such, implementation is as important, or even more important, than the strategy itself. Noting the importance of the strategic approach towards implementation, it is critical to develop a clear and structured approach that provides a practical and pragmatic basis from which implementation is enabled.

Implementation does need to be supported by ensuring that there is capacitated staff, sufficient resources, appropriate structures, supportive systems and an enabling culture. It is important to recognise that despite the development of various methodologies and instruments over the last 25 years, all with the aim to enhance water quality management, the status of water resource quality is worsening.

Strategy experts will note that in many instances strategies fail due to the fact that without fully understanding the challenges, and racing to develop and implement various solutions, that there is often an over emphasis on form over function. This results in avoiding addressing real issues like creating improved, efficient and effective action, and that often there is not the creation of active learning environments that enable staff and stakeholders to jointly learn and develop adaptive responses (Andrews, Pritchett and Woolcock, 2012)[2].

There is therefore a need for a change in approach in order to ensure that the trajectory of declining water resource quality is checked, that we start to create the right capacity to strengthen our management of water resources whilst working towards a longer term vision of on-going IWQM that is supported and enabled through adaptive management approaches.

6.1 Strategic Approach

Whilst there is a need to change our approach to WQM, it must be recognised that there is a well-conceived framework for WQM that needs to continue being implemented (**Figure 14**). There is an array of instruments that are used on a day-to-day basis that whilst may need refinement and improvement can continue to serve the purposes of IWRM.

Therefore, the approach does need to be two-fold in carrying on to utilise the existing frameworks for the business of WQM, whilst building and improving for the longer term. At the same time, there is a need to demonstrate success by turning around some key issues as a way of generating passion and support. These approaches can work well together.

[2] Andrews, M., Pritchett, L. and Woolcock, M. 2012. Escaping capability traps through Problem-Driven Iterative Adaptation (PDIA). CGD Working Paper 299. Washington D.C. Center for Global Development

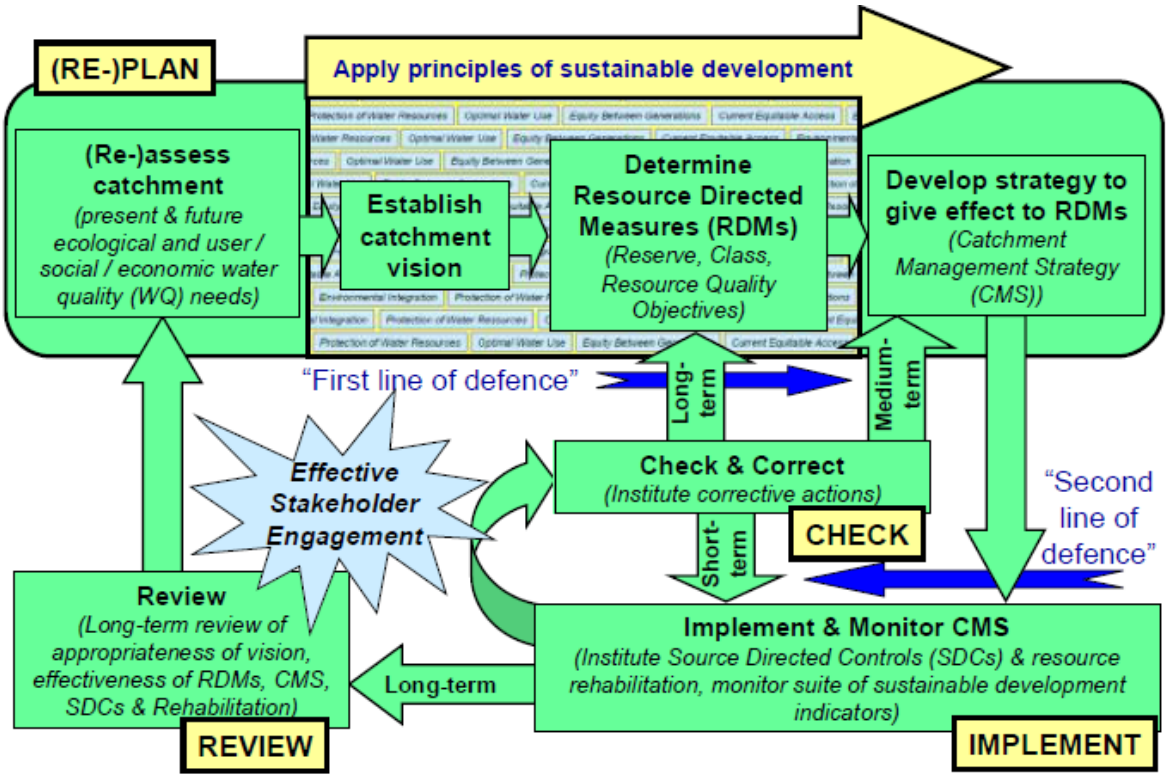

Figure 14: The integrated water quality management process (DWAF, 2006)

The strategic approach is, therefore, constructed around three key focal areas (KFAs) namely, fixing priority issues, building capacity and sustaining the existing system of integrated WQM. These have some sense of time frames linked to each but all will have short to longer term dimensions. These will be developed in the implementation plan.

6.1.1 Fix priority issues

This will provide the opportunity to realise success in addressing key issues and will embark on looking at rehabilitation or remediation in critical catchments. This will also entail looking at priority issues that can support the building of capacity and the on-going application of exiting instruments.

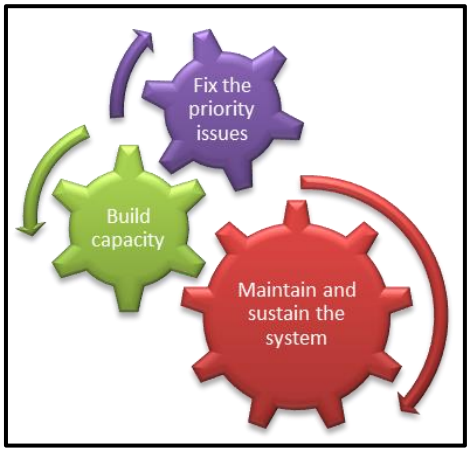

Figure 15: The Key Focus Areas

6.1.2 Build capacity

Whilst it is understood that the capacity that the water sector requires will not be in place within the short term, in terms of skills, integrated information and systems, this is an important issue that needs to be driven immediately and continued over time in order to build adaptive management capacity. This also includes the development of cooperative partnerships across government, private sector and civil society.

6.1.3 Maintain and sustain the system

The on-going processes that the DWS has in place will continue to be utilised to manage water quality across the country. These instruments and systems may require strengthening over time. This could involve exploring ways in which to improve and simplify some these instruments. This would include a drive to look at where instruments and systems can be integrated between departments in order to improve inter-departmental approaches.

6.1.4 Time frames for Implementation

As noted, the strategic approach will require interventions over the short to longer time frames. However, in order to give effect to the vision, mission, goals and strategic objectives outlined in this strategy, a number of key actions are required for implementation in the short term, for example:

- Institutionalising and embedding the new approaches to WQM.
- Fast-tracking the establishment/capacitation of the CMAs and development of CMSs.
- Development and finalisation of IWQM Plans for key catchments.
- Capacitation of WQM officials to perform their key functions.
- Updating data and information systems to strengthen WQM regulation.
- Formalisation of partnerships with both private sector and civil society to unlock capacity, skills and finances, however, more importantly, to bring the partners on board to co-create solutions for WQM.
- Implementation of the WDCS.

When considering the full suite of Strategic Actions (Appendix D), they support the five goals by enabling WQM (**Goal 1** & **Goal 2**), by supporting WQM (**Goal 4** & **Goal 5**) or by supporting the implementation of WQM (**Goal 3**). The Strategic Action bubbles are colour coded to represent the Goal that they are supporting as illustrated in **Figure 16.**

The Strategic Actions under these goals then support or three strategic KFAs over time as reflected in Figure 17. Refer to Appendix D for full list of Strategic Actions.

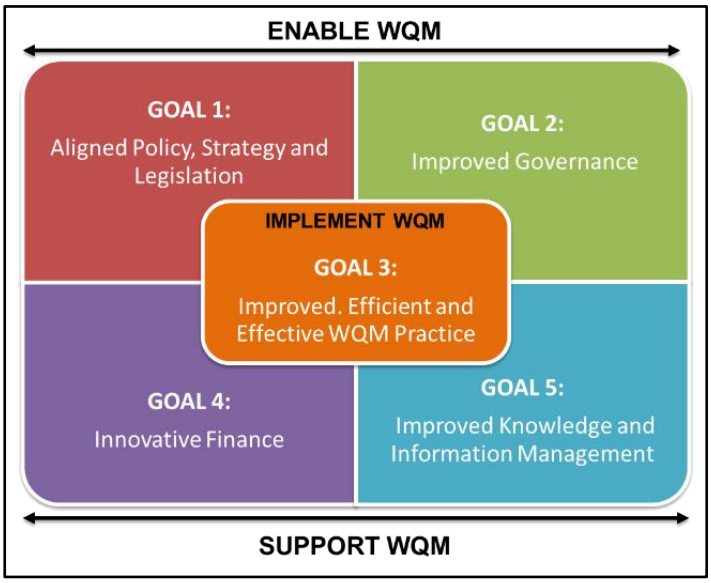

Figure 16: The Goals to enable, support and implement improved WQM

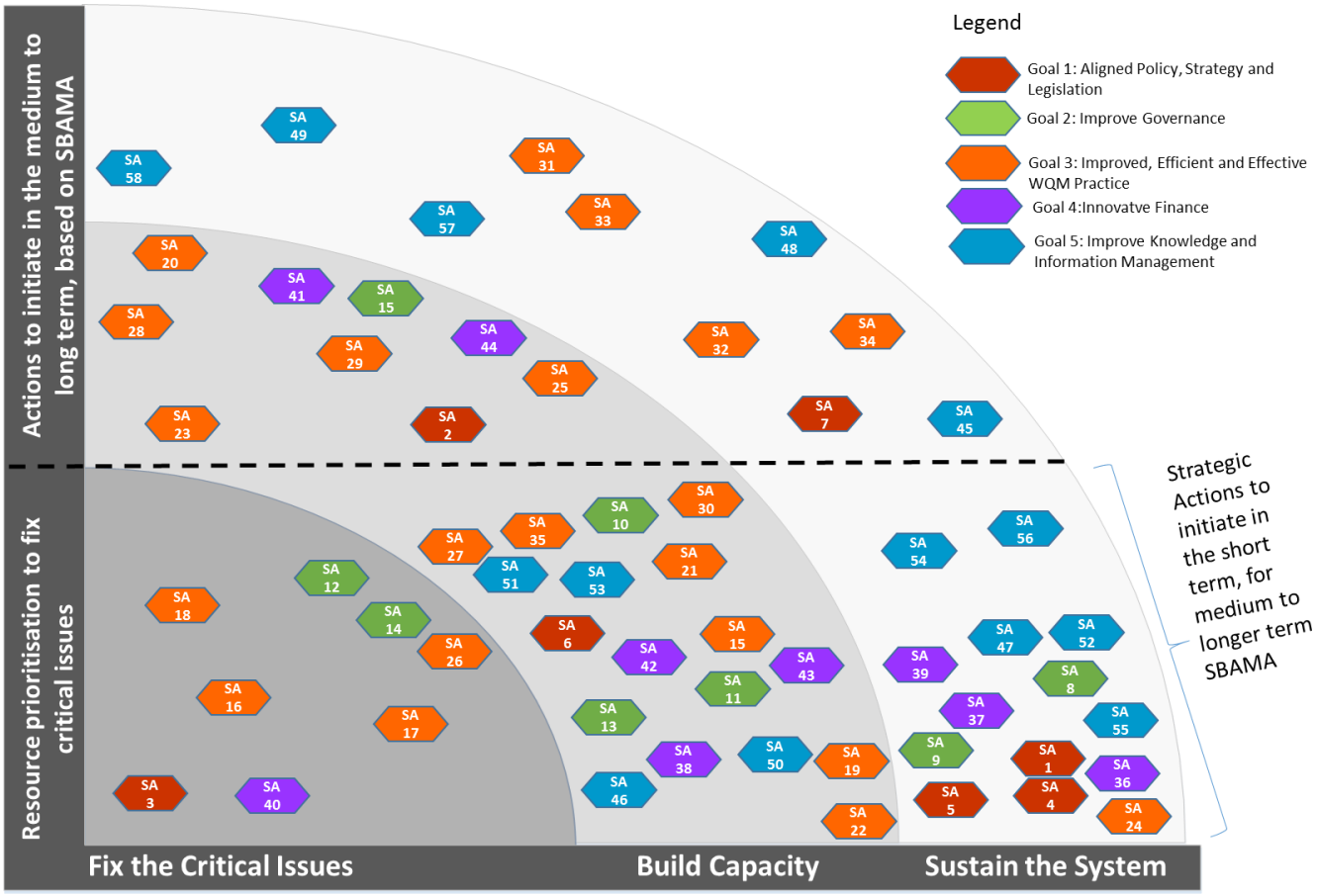

Figure 17: Strategic actions in support of the KFAs

Figure 17 above reveals that:

- Goal 1 and Goal 2 require immediate initiation.
- Goal 3 is spread across the spectrum
- Goal 4 requires some initial actions to be implemented, however, with a longer term view (1.e. finance charges)
- Goal 5 similarly.

Although this will be developed further in the implementation plan, an immediate analysis shows us that the following key actions may need to be considered as early priorities.

In the immediate term, an agreement, even if just in principle, needs to be achieved between the Department of Water and Sanitation and its sector partners in support of the inclusive, integrated and adaptive approach to managing water quality in the country.

A step towards achieving this is the nine provincial workshops aimed at soliciting regional and catchment-specific inputs that will inform both the IWQM Strategy as well as the WQM Implementation Plan. Furthermore, at a sectoral level, an inter-departmental workshop is scheduled for later this year to obtain buy-in and support for from the sector leaders (DMR, DEA, DAFF, COGTA, etc.) around the establishment of an inter-departmental committee to oversee WQM.

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APPENDIX A: SUMMARY OF ROOT CAUSES OF PRIORITISED WATER QUALITY ISSUES

Table A-1: Summary of Root Causes of prioritised water quality issues

WQ ISSUE	DRIVER	ROOT CAUSE
Eutrophication	▪ Wide-spread discharge of raw or inadequately treated municipal sewage. ▪ Raw sewage overflows. ▪ Diffuse runoff and drainage from fertilized cultivated land.	**Point Source** ▪ Dysfunction in many municipalities, manifested by any or all of the following shortcomings: inadequate financial and operational planning, inappropriate financial prioritisation, lack of pro-active infrastructure maintenance, inadequate problem reporting/response systems, lack of appropriate technical personnel and financial shortfalls. ▪ Inadequate cooperative governance and cross-regulatory interfaces between DWS and the affected municipalities, the Department of Cooperative Governance and Traditional Affairs (COGTA) and various other government institutions. **Diffuse/Non-Point Source** ▪ Inappropriate farming practices, such as over-fertilisation, inappropriate tillage, over-irrigation and encroachment on or destruction of riparian buffer zones and wetlands. ▪ Inadequate cooperative governance and cross-regulatory interfaces between DWS and the National Department of Agriculture, Forestry and Fisheries (DAFF) and its provincial counterparts and various other government institutions hinders the management of these phenomena.
▪ **Salinisation**	▪ Diffuse drainage and wash-off of rainfall-mobilised natural in-situ salts in soils. ▪ Diffuse sub-surface irrigation return flows. ▪ Mine water drainage and atmospheric deposits.	▪ Inappropriate farming practices, such as inappropriate dry-land tillage, inappropriate dry-land crops, over-irrigation, inappropriate irrigation technology, lack of intercepting drainage and related evaporation pond infrastructure, and inappropriate irrigation water conveyance practices. ▪ Inadequate cooperative governance and cross-regulatory interfaces between DWS and DAFF and its provincial counterparts. ▪ Acidic atmospheric deposits: inappropriate licence conditions for Eskom and Sasol; lack of monitoring and reporting of their own pollution loads; lack of enforcement; and inadequate cooperative governance and cross regulatory interfaces between Eskom, Sasol, the National Energy Regulator, DEA and DWS.
Acidification and alkalinisation	▪ Discharge into surface waters from abandoned mine shafts / ▪ Contaminated seepage, leaching, runoff and spills.	▪ Water resource acidification: historical and recent lack of precautionary planning, regulation and enforcement by the relevant authorities, and of ring-fenced rehabilitation financing for the necessary rehabilitation by the relevant mining companies. ▪ Heavy metals contamination and related issues: lack of compliance by mines and thermal power stations of their

WQ ISSUE	DRIVER	ROOT CAUSE
	▪ Wash-off and leaching of widespread acidic atmospheric deposits.	licence conditions; lack of or inappropriate licence conditions; lack of monitoring and reporting of their own pollution loads; inadequate enforcement capacity in the national and provincial Environment Affairs departments and DWS; and inadequate cooperative governance and cross-regulatory interfaces between the Department of Mineral Resources (DMR), the National Energy Regulator, DEA and DWS. ▪ Acidic atmospheric deposits: inappropriate licence conditions for Eskom and Sasol; lack of monitoring and reporting of their own pollution loads; lack of enforcement; and inadequate cooperative governance and cross regulatory interfaces between Eskom, Sasol, the National Energy Regulator, DEA and DWS.
Urban Pollution Runoff	▪ Storm-water runoff from formalised pervious and impervious urban areas. ▪ Sewer overflows into storm-water conduits. ▪ Storm-water runoff from less-formalised dense peri-urban or rural human settlements.	▪ Dysfunction in many municipalities. ▪ Lack of or inappropriate infrastructure, inadequate financial and operational planning, inappropriate financial prioritisation, inadequate problem reporting/response systems, lack of pro-active infrastructure maintenance, lack of appropriate technical personnel and financial shortfalls. ▪ Inadequate cooperative governance and cross-regulatory interfaces between the affected municipalities, DWS, and (COGTA).
Sedimentation	▪ Anthropogenically-driven erosion of surface soils of catchments and of stream/river banks.	▪ Erosion: inappropriate crop cultivation and silviculture practices; over-grazing; destruction or encroachment of riparian vegetation buffer zones; destruction or encroachment of wetlands; physical modification of river channels and banks; excessively dense less-formalised human settlements; careless construction activities; amongst others. ▪ Lack of suitable qualification criteria for farmers entering the field, combined with inadequate support from Government and the sector. ▪ Inadequate cooperative governance and cross-regulatory interfaces between DWS and DAFF and its provincial counterparts, DEA and its provincial counterparts, and various other government institutions.

APPENDIX B: WATER QUALITY MANAGEMENT SWOT ANALYSIS

Table A-2: Summary of WQM SWOT Analysis

INTERNAL TO DWS AND CMAs	
STRENGTHS	**WEAKNESSES**
Legal/Regulatory: 1. Sound statutes, policies, strategies and regulations: Constitution, NWA, NWRS, CMSs, etc. 2. Fully developed Waste Discharge Charge System (WDCS) - ready for implementation. 3. "New" Water Act – strengthen focus on WQM. 4. e-WULAAS (Electronic Water Use Licence Application and Authorisation System) is active – Client can upload data directly and is aimed at enabling DWS to keeping better records of water use authorisations. 5. Incentive based regulation at municipal level, e.g. Blue- , Green- and No-Drop accreditation, is now well-established. 6. Sound mine water regulations. **Institutional – Structural:** 7. Improved implementation of NWRS-2 8. CMA establishment process recently prioritised. 9. Strong water institutions – e.g. TCTA, Water Boards, Regional Water Utilities.	**Legal/Regulatory:** 1. Inappropriate water use licence conditions. 2. Inaccurate or out-of-date water use licence database 3. "New" Water Act – non-transparent process hitherto **Institutional - Structural:** 4. The WQM structure of the Department too fragmented – needed: a single "centre of excellence". 5. WQM roles and responsibilities not clear, no clearly stated goals, no dedicated WQ programme with reporting. 6. Inadequate or insufficient enforcement, conviction and punitive measures for non-compliance due to inadequate integration in DWS - enforcement relies heavily on functions of / information gathered by other DWS sections. **Institutional – Management:** 7. Slow implementation of the NWRS. 8. Failure to implement the WDCS. 9. Inadequate implementation of sound policies and strategies. 10. Slow CMA establishment processes until recently. 11. Inadequate understanding of WQM at senior management level. 12. Insufficient succession planning and gaps created by loss of both experienced and recently trained staff. 13. Lack of a customer service orientation in some regional offices. 14. DWS currently does not have active contracts with a number of private laboratories.

INTERNAL TO DWS AND CMAs	
STRENGTHS	**WEAKNESSES**
Institutional – Processes: 10. Sound water quality management instruments - guidelines, protocols, manuals, strong licensing process. 11. IWRM is a central competency in DWS and CMAs. 12. Classification and RQOs development in progress and RQO implementation will be facilitated by the DWS project on operationalising RDM. 13. IWQMS project has been initiated. 14. New integrated NWIS system being developed. 15. Ability of DWS to mobilise in times of water crisis. **Institutional – Capacity:** 16. Pockets of scientific and management excellence in DWS and CMAs. 17. Increasing capacity in CM&E at national level. 18. Internal WQM training course has been partially re-instated. 19. Investment in relevant graduate training programmes. 20. Alignment of DWS bursaries with scientific implementation needs of the Department. 21. Learning Academy for graduate trainees. 22. Continuity of research funding by WRC relevant to WQM. **Technical:** 23. Strategic spatial coverage of RSA by DWS monitoring network. 24. Project underway to identify localised monitoring gaps and to prioritise their resolution.	15. Inadequate delegations within DWS with regard to WQ - supresses innovation. 16. Poor staff morale, leading to decreasing productivity. 17. Long delays in decision-making at most senior levels in DWS. 18. Lack of senior management understanding of integration necessities for WQM and their costs. 19. Reduced resourcing of WQ monitoring – leading to backlogs at DWS's RQIS laboratory. 20. Lack of alignment of functions between National and regional/provincial DWS and/or CMAs. 21. Poor alignment of CD Business Plans and NWRS2. 22. Inadequate communication by senior DWS leadership to officials. 23. Repeated restructuring – hampers functionality and demoralises staff. 24. Lack of leadership by DWS in the Water Sector and poor promotion of /understanding of the importance of sectoral partnerships with DWS. **Institutional – Processes:** 25. Historical lack of alignment/interfaces of current IT infrastructure (WARMS/SAP/WMS/NWIS) – inadequate regional implementation. 26. Verification and validation projects do not include water quality information. 27. Lack of clarity regarding respective WQM roles and responsibilities at catchment level of DWS National, DWS Provincial/Regional, CMAs and Catchment Forums. 28. DWS functionality affected by a blurred mandate of having to be both referee and player in WQM, leading to conflicting strategic or tactical approaches. 29. Deficient implementation of RQOs - currently no guidelines for the implementation of RQOs. 30. Inadequate knowledge input regarding WQM, as well as inadequate project/ programme management. 31. Inadequate stakeholder databases for Classification and RQO determination processes. 32. Uneven and silo-like engagement of stakeholders. 33. Lack of formal policies and guidelines on how DWS should deal with innovative technologies, e.g.

INTERNAL TO DWS AND CMAs	
STRENGTHS	**WEAKNESSES**
25. DWS and CMAs mostly have reasonable WQ data to support decision-making. 26. Growing appreciation among WR planners and managers that water quality and quantity should be managed as an integrated whole. 27. Sound chemical analysis laboratory facilities, accredited by SANAS, at national & regional levels. **Cooperative Governance:** 28. Willingness by DWS officials to collaborate with other Government and private sector institutions in support of WQM. **Social:** 29. Positive public perception of DWS.	what criteria should be met in terms of acceptable risk, or what stance DWS should take towards new technologies. 34. WQ guidelines and procedures are becoming outdated and have not been reviewed. 35. Lengthy procurement processes to appoint accredited private labs to support regional office sampling. 36. Inadequate network / system for learning-sharing of experience. 37. Problematic procurement processes prevent initiation of crucially needed studies. **Institutional – Capacity:** 38. Absence of DWS's internal WQM training course during recent years. 39. Insufficient or unsuitable technical and scientific capacity in DWS (national and regional) and CMAs. 40. CM&E function at provincial/regional level not sufficiently staffed. **Technical:** 41. Localised gaps in DWS strategic monitoring network. 42. WQ dimensions of planning often poorly considered in water resource planning. 43. Inadequate alignment between WRC research and DWS priorities. 44. Monitoring and data increasingly insufficient to undertake effective management of the resource. 45. Groundwater quality not adequately monitored and managed. 46. WQ data not available on WMS- therefore difficult to access. 47. Inaccurate entering of WQ-related data into DWS's systems. 48. Insufficient accredited laboratories in certain strategic regions. 49. Unfriendly data entering in current systems - officials could be using cell-phones to load data instead of having to come into the office to download / upload data. 50. Long-term streamflow gauging stations and sampling sites being de-commissioned.

INTERNAL TO DWS AND CMAs	
STRENGTHS	**WEAKNESSES**
	51. Only one laboratory available for analysis of certain key constituents. 52. Inadequate monitoring of emerging problematic WQ constituents. **Cooperative Governance:** 53. DWS's dependency on other departments to jointly regulate and on regulatory mechanisms and tools developed by those departments. 54. DWS's current mandate precludes direct intervention in instances of dysfunctional municipalities or failing water services. 55. Insufficient communication by DWS to the public regarding pollution issues; lack of integration of communication initiatives relevant to WQM with those of other Government Departments. **Political:** 56. Inadequate political support for WQM caused by multiple changes in DGs and Ministers during recent years. 57. Lack of political will to fundamentally change approaches or tactics that have not yielded WQ improvements. 58. Perception in DWS management that consultants should not be needed and that all work should be done in-house. **Social:** 59. Lack of trust in recent and current WQ monitoring data and DWS monitoring. 60. Forums lack sufficient engagement support from DWS. 61. Confused public perception of WQ-related mandates – contributed to local government's neglect of WWT functions.

EXTERNAL TO DWS AND CMAs	
OPPORTUNITIES	**THREATS**
Legal/Policy/Regulatory: ○ Alignment of measures under NEMA, CARA, MPRDA and NWA to support WQM. ○ "New" Water Act – opportunity to strengthen focus on WQM. ○ DWS to promote institutional/legal framework to intervene in failing water and sanitation functions at municipalities with a lead by COGTA and National Treasury. ○ Water policy - currently under review. ○ Establishment of integrated regulatory water monitoring committees. ○ Influence SADC processes/agreements re WQM. **Cooperative Governance / Partnerships:** ○ Renewed government focus on cooperative governance. ○ Integration of monitoring and sharing of resources relevant to WQM through collaboration among government institutions. ○ Water stewardships/ CEO Water Mandate – Alliance for water stewardship has developed standards. ○ Involvement of private sector to solve water quality problems through a dynamic sector-based programme. ○ Incentivise water users, industries and businesses to reduce water pollution. ○ On-going DWS / CMA engagement of sectoral and social stakeholders and partners and promoting the concept of joint custodianship of WQM.	**Legal/Policy/Regulatory/Mandates:** 1. Lack of law enforcement by municipalities in cases of WQ pollution. 2. Municipalities ignore effluent licence conditions – lack of enforcement by DWS. 3. Overlaps/confusion of statutory/regulatory/oversight mandates that affect WQM. 4. Water policy - currently under review. 5. "New" Water Act – non-transparent process hitherto. 6. Impacts of international trade agreements on WQM. **Institutional:** 7. Dysfunction in many municipalities. 8. Political uncertainty / instability at local government level - affects human and financial resources. 9. Decision-making paralysis at senior levels in non-DWS government institutions relevant to WQM. 10. CMAs not adequately prepared to deal with competing interests, e.g. mining and water are both strategically important for development in a region. 11. Susceptibility to seek quick fixes among senior managers in government institutions relevant to WQM. 12. Sustainability of water institutions, such as CMAs and Regional Water Utilities. 13. Lack of a dedicated facility external to DWS that can take the lead in WQ monitoring and reporting. **Cooperative Governance / Partnerships:** 14. Fragmented or absent cooperative governance regarding WQM between DAFF, DMR, DEA, DTI, COGTA, DHS, provincial and local governments and DWS. 15. Inadequate resourcing (human and financial) of cooperative governance mechanisms. 16. Inadequate cooperative governance between Government Departments (e.g. DMR, DEA and DWS) regarding licence conditions. 17. Inadequate buy-in to the new IWQMS by relevant senior officials in DAFF, DMR, DEA, DTI, COGTA,

EXTERNAL TO DWS AND CMAs	
OPPORTUNITIES	**THREATS**
Planning Processes: ○ National Development Plan (NDP). ○ WSDPs and IDPs – need to give WQM priorities prominent consideration. ○ Sustainable Development Goal (SDGs) actions given RSA's signed commitment; e.g. use of SDGs to influence IDPs. ○ Climate Change – raises the profile of WRM, including WQM. **Funding:** ○ Green Fund/Climate Funds - DBSA initiative to investigate issuing of water bonds. ○ NBBN and other investments in ecological infrastructure; SANBI's ecological infrastructure directorate funds eco-infrastructure critical for WQM. ○ Financial incentives for water re-use. ○ Financial incentives (including donor funds) for municipalities to maintain declared targets for WQM. ○ Economic down-turn - WQM institutions to be more effective with spending, finding innovative ways of treating water and seek alternative sources of funding. **Social:** ○ Organised civil society activism - engaged public can contribute to monitoring and management of WQM. ○ Improved and integrated multi-institutional WQM awareness campaigns - lead by DWS.	DHS, provincial and local governments, organised agriculture, Chamber of Mines. 18. Lack of macro-strategy by DWS to foster understanding among water user sectors of importance of joint custodianship of the resource and partnerships with DWS and CMAs. 19. Confusion about water governance set-up and lack of understanding of the WQM function among relevant government institutions - leading to poor coordination and/or conflicting strategic approaches – impacts WQM negatively. **Planning Processes:** 20. Increased resource pressure from economic and social development drivers (linked to NDP) – focus on economic growth (short-term) versus sustainable growth (long-term). 21. Inadequate coordination between government development planning functions and National Treasury. 22. Unclear impacts on Water Quality by climate change (pathogens, flooding, disaster management). 23. Fragmented approach to planning – national, regional and municipal planning lacks integration. **Funding:** 24. Lack of sustainable financial models for local government, leading to inadequate funds to maintain WWTWs. Alternatively, the financial models may be sufficient but there is a lack of political will to use them / address the financial provisioning requirements. 25. Current economic downturn - impacts finances available for WQM - impacts of poorer Water Quality on economic productivity. 26. Mining industry has been in serious decline in recent years – not amenable to investing in WQM, regardless of the Green Credits that might accompany such investments. **Social:** 27. Lack of public awareness regarding importance of WQM.

EXTERNAL TO DWS AND CMAs	
OPPORTUNITIES	**THREATS**
○ Improved and supported Civilian Science, e.g. Adopt-a-River – typically used to spot major problems that need urgent attention, e.g. spills, illegal activities. ○ Drought and other water-related crises, such as pollution events – mobilise political attention, raise profile of water management and engender innovative approaches to support WQM. ○ Use of social media by DWS and CMAs to mobilise public knowledge banks and public sense of custodianship. **Technical:** ○ Re-mining slimes dams and centralising slimes disposal frees up land for further development. ○ Re-use of and extraction of beneficial products from polluted water. ○ Introduce enforced metering of all water abstractors. ○ Independent water producers – "smart" solutions. **Capacity:** ○ Further research on IWRM implementation in South Africa. ○ DWS to take the lead to develop and support a compendium of external WQM-related training courses conducted by various universities, CSIR, WISA, HSRC, ARC, SAICE, etc.	28. Failures by municipalities to execute their water/sanitation-related functions adequately, are increasingly undermining public confidence in DWS. **Technical / Management:** 29. Inadequate monitoring and management of monitoring data of effluent quality and quantity by water users & regulators. 30. Current drought conditions – loss of dilution. 31. Green/Natural Infrastructure - not adequately maintained. 32. Threats from new technologies, e.g. unconventional gas and oil production – lack of ability to test and monitor threats; lack of applicable legislation re WQM impacts. 33. Insufficient information on emerging WQM threats. 34. Radioactivity, brackish water, hydrocarbons – not in baseline monitoring – lack of addressing previously unknown risks. 35. Lack of understanding or accommodation of cumulative impacts of different pollutant drivers and different WQM activities. 36. Spatial and temporal variations make it difficult to manage the resource and interconnectivity of basins makes WQM complex - can have perverse outcomes across basins. **Capacity:** 37. Technical and scientific capacity challenges in local government. 38. Continuing loss of senior technical / scientific capacity in relevant government institutions. 39. Lack of understanding or inconsistent application of the "WQM hierarchy" by water user sector managers. **Other:** 40. Deteriorating Water Quality poses a risk for competitiveness of business, particularly, fruit and

EXTERNAL TO DWS AND CMAs	
OPPORTUNITIES	**THREATS**
	vegetable exporters, and a general risk to the economy of South Africa. 41. Economic and financial losses in crop production and manufacturing caused by deteriorating Water Quality. 42. Political interference in WQM-related decisions - resulting in perverse outcomes. 43. Unsure political climate - results in limited investment, including in WQM

APPENDIX C: WATER QUALITY MANAGEMENT POLICY PRINCIPLES

Table A-3: WQM Policy Principles

GOVERNANCE PRINCIPLES
Principle 1: Government-wide water quality management *It is the Constitutional duty of all spheres of government to protect the quality of South Africa's water resources.* **Principle 2: Subsidiarity and accountability** *Water quality should be managed at the lowest appropriate level and the institutions responsible for managing water quality must be held accountable.* **Principle 3: Trans-boundary water quality management** *Water pollution is a spatial and administrative trans-boundary water management problem that must be managed within the principles of the SADC Protocol on Shared Watercourses and the NWA.* **Principle 4: Partnerships** *In order to manage water quality effectively, partnerships should be developed between government, the private sector and civil society.* **Principle 5: Administrative fairness and implementability** *Regulation must be administratively fair, and must also be effectively implementable within technical and financial resource constraints.* **Principle 6: Administrative Penalties** *A system of effective administrative penalties for water pollution offences must be adopted*
ECONOMIC AND FINANCE PRINCIPLES
Principle 7: Water quality is a developmental issue *In addressing the management of water quality, the developmental, economic, social and environmental impacts of deteriorating water quality must be taken into account.* **Principle 8: Broadened funding mechanisms** *The mechanisms for funding water quality management should be broadened, given that water quality has impacts on, and is impacted by, many different sectors, and recognising the negative developmental impact of declining water quality.* **Principle 9: Polluter pays** *The costs of remedying pollution, degradation of resource quality and resulting adverse health effects, and of preventing, minimising or controlling pollutions is the responsibility of the polluter.*

OPERATIONAL PRINCIPLES

Principle 10: An integrated and adaptive approach

An integrated and adaptive, systems-based resource, remediation and source directed approach which manages the water resource system as a whole at catchment or sub-catchment scale will be adopted, e.g. to include integration between "quality" and "volume", integrated planning, integrated regulation, etc.

Principle 11: Hierarchies of water use and pollution management decision-making

Principle 10 implies that water quantity and quality must, from the outset, be considered as "two sides of the same coin". In light of that, water use and pollution management will follow a hierarchy of decision-making in which:

- *Prevent, where possible.*
- *Minimise, where possible or be subjected to specific licence conditions or minimum standards.*
- *If the above options have been exhausted, then appropriately apply the cross-cutting Precautionary, Continuous Improvement and Adaptive Management approaches.*
- *If the resource water quality is degraded below the determined resource class, rehabilitate and remediated and as a last resort reclassify.*

Principle 12: Green/ecological Infrastructure restoration and rehabilitation

Rehabilitation and restoration of catchments should be pursued, including the use of green/ecological infrastructure

Principle 13: Risk-based approach

A risk-based approach to regulation should be adopted, based on the likely magnitude of potential impacts.

DATA AND INFORMATION PRINCIPLES

Principle 14: Collection and protection of data

Data on water quality must be standardised, collected, managed and protected as a strategic asset for monitoring, management and research purposes, while also being used to support co-learning and adaptive management.

Principle 15: Publicly available information

Information and data on water quality and waste discharges must be available in the public domain and should be used to enhance public awareness and education, and to support adaptive management approaches.

APPENDIX D: SUMMARY OF THE IWQM STRATEGIC OBJECTIVES AND ACTIONS

Table A-4: Summary of Strategic Issues, Objectives and Actions

Strategic Issues	Strategic Objectives	Strategic Actions
Strategic Issue 1: Harmonization of Policies and Strategic to enable improved WQM	**SO 1 a**: Policies and Strategies impacting upon IWQM are harmonized	**SA1:** DWS to ensure that policy development and refinement within DWS addresses WQM
		SA2: Sector departments to harmonise policies and strategies to support IWQM
		SA3: DWS to finalise and implement non-point source pollution strategy
STRATEGIC ISSUE 2: Legislative review and amendments to enable integrated WQM	**SO2a:** NWA/WSA effectively support integrated WQM	**SA4:** DWS to amend NWA and WSA to provide effective support to integrated WQM
		SA5: DWS to develop guidelines and protocols on the effective use of instruments
	SO2b: Other legislation effectively supports integrated WQM	**SA6:** National Treasury and DWS to promulgate a Money Bill for the Waste Discharge Levy
		SA7: DWS, DAFF, DMR and DEA to identify and amend relevant legislation to strengthen WQM
STRATEGIC ISSUE 3: Improved WQM institutional structuring	**SO3a:** DWS departmental structures support integrated WQM	**SA8:** DWS to reconfigure the departmental WQM function as needed to ensure efficiency and effectiveness
		SA9: Develop the institutional protocols to enable DWS intervention in municipalities regarding discharges form failing
	SO3b: Inter-sector departmental structures established to support integrated WQM	**SA10:** Establish intergovernmental WQM structures at trans-boundary basin, national and joint action supported by regular reporting (link to activity on MoAs)
		SA11: Government departments to develop sector WQM plans and report annually on progress
STRATEGIC ISSUE 4: Formalise governance frameworks to support non-governmental engagements	**SO4a:** Partnerships/stewardships established and maintained	**SA12:** DWS to develop a partnership framework that is fair and equitable
		SA13: DWS to develop and foster strategic sector partnerships
	SO4b: Governance framework for active citizenry formalized	**SA14:** DWS with DEA and CMAs to develop an engagement framework that enables more active participation of civil society at transboundary, national and catchment

Strategic Issues	Strategic Objectives	Strategic Actions
		levels
		SA15: DWS, DEA and CMAs to support and drive functional platforms for the engagement of civil society nationally and within catchments
STRATEGIC ISSUE 5: Improved coordination in integrated planning	**SO5a:** Integrated sectoral planning approach is adopted at transboundary and national level	**SA 16:** DWS to lead the development of an IWQM plan for national priority catchments, ensuring consideration of transboundary WQ concerns
		SA 17: DWS, with NT, SALGA and COGTA to develop a strategic action plan for the rehabilitation and upgrade of prioritized WWTWs
		SA18: DWS to work with DMR and DEA to develop a strategic action plan for the implementation of the mine-water management policy
		SA 19: DWS/DAFF/DMR/DEA/DRDLR/COGTA to development strategic action plan to reduce non-point source pollution
		SA 20: DWS, DEA, SALGA and COGTA to develop a protocol for the management of industrial discharge within the municipal environment
	SO5b: Integrated sectoral planning approach adopted in catchment/regional plans	**SA 21:** CMAs to develop an IWQM plan for each water management area as part of the CMS
		SA 22: DWS, DEA and DMR to integrate IWQM and water resource planning with Regional Mining Plans in priority areas
		SA 23: DWS and COGTA to ensure that WSDPs, IDPs and SDFs reflect WQM priorities and management responses
STRATEGIC ISSUE 6: Strengthen IWQM Regulation, Compliance and Enforcement	**SO6a:** Licencing processes streamlined	**SA 24:** DWS to address the backlog of WUL applications urgently and to meet stipulated timeframes for new licence applications
		SA 25: DWS, DEA to develop risk-based protocols for determining water use authorization
		SA 26: DWS/CMAs to develop protocols for CMA engagement in IWUL applications and approval processes
		SA 27: DWS, DEA, DAFF and DMR to develop and implement a protocol for integrated licensing processes

Strategic Issues	Strategic Objectives	Strategic Actions
		SA 28: DWS, DEA, DAFF and DMR to develop information management systems to support the integrated licensing approach
	SO6b: Targeted/strengthened compliance monitoring and enforcement of key polluting sectors	**SA 29:** DWS, DEA to develop improved regulatory approaches to manage WQ pollution from land-based activities
		SA 30: DWS, DEA, CMAs to develop a targeted approach for the enforcement of regulation
		SA 31: DWS, DEA to assess gaps in regulatory frameworks and instruments and develop revised approaches and instruments as necessary
		SA 32: DWS, DEA, CMAs to develop systems for joint CME
STRATEGIC ISSUE 7: Application of Systems-based Adaptive Management Approaches	**SO7a:** Adaptive systems-based management is applied at catchment level	**SA 33:** CMAs to develop localised programmatic monitoring and reporting of actions and outcomes
		SA 34: CMAs to lead process with other relevant government departments and agencies, and stakeholders, to review, identify and address priority WQ challenges at regular intervals
		SA 35: DWS with DEA and CMAs to develop protocols for systems-based adaptive management for IWQM.
STRATEGIC ISSUE 8: Fiscal support for integrated WQM	**SO8a:** WQM interventions are financially supported by the fiscus	**SA 36:** WRC to support research into the socio-economic-environmental and management costs of poor WQ
		SA 37: DWS to develop an investment framework including innovative mechanisms to mobilise funding for sustained support to IWQM
		SA 38: DWS, with COGTA, SALGA, to review municipal conditional grants
		SA 39: DWS to develop and implement a protocol for extending the financial provisioning clause to all industries that are deemed "high-risk" polluters.
STRATEGIC ISSUE 9: Develop pricing and incentives that support integrated WQM	**SO9a:** The Waste Discharge Charge System is implemented	**SA 40:** DWS, with CMAs, to implement the WDCS in priority catchments
		SA 41: DWS, with CMAs, to develop an action plan to support the phased implementation of the WDCS across the country

Strategic Issues	Strategic Objectives	Strategic Actions
	SO9b: Mechanisms for incentivising good practice developed	**SA 42:** DWS/DEA/WRC to explore innovative financing mechanisms for incentivising good IWQM practice
		SA 43: DWS and NT to determine financial incentives for water-reuse (AMD, other)
		SA 44: DWS/DEA to develop the legal and institutional mechanisms for introducing administrative penalties for environmental non-compliance including water pollution.
STRATEGIC ISSUE 10: Strengthen Monitoring and Information Management	**SO10a:** An integrated and functioning WQ monitoring network	**SA 45:** DWS/CMAs to strengthen national and catchment WQ monitoring networks through spatial expansion and identification of priority constituents for catchment-specific monitoring
	SO10b: Information systems that are current and accessible to support adaptive WQM	**SA 46:** DWS, with the WRC and CMAs, to lead the development of a programme to create and support citizen-based monitoring programmes
		SA 47: DWS/DEA/CMAs to ensure the harmonisation of data and information systems pertaining to WQ
		SA 48: DWS, CMAs, DEA, DAFF, DMR to develop systems to enable data and information access by stakeholders/public
	SO10c: Routine assessments inform adaptive WQM	**SA 49:** DWS/DEA/CMAs to develop protocols and systems to ensure M&E and new information inform adaptive management decisions for IWQM
STRATEGIC ISSUE 11: Build WQ and WQM Capacity through Education, Training and Communication	**SO11a:** Sustained capacity for Government /CMA/sector to effectively manage and support WQM through improved education and training	**SA 50:** DWS/WRC to develop and implement a capacity building programme for officials in DWS, CMA and other sector departments in systems-based, adaptive IWQM
		SA 51: DWS/CMAs to expand capacity-building initiatives to civil society and private sector
		SA 52: DWS to develop regulations to ensure the professionalization of key water services functions
		SA 53: DWS/private sector to providing bursaries/learnerships pertaining to WQM at tertiary institutions
	SO11b: WQM decisions are underpinned by best practice, research and innovation	**SA 54:** DWS, with the WRC, to investigate the options provided by recent innovative developments to improve water quality
		SA 55: WRC to lead the sector in innovation, research and development for IWQM

Strategic Issues	Strategic Objectives	Strategic Actions
	SO11c: A well informed and actively engaged South Africa	**SA 56:** DWS to report annually on the state of WQ in the country
		SA 57: DWS/WRC to develop online tools for easy access to WQ and WQM related information
		SA 58: DWS/DEA/DAFF/DMR/CMAs to develop and maintain multi-sector stakeholder platforms for sharing information