

CLIMBING SOUTH AFRICA'S WATER SERVICES LADDER

Safe Drinking-Water through Regulatory Governance

GS Mackintosh, T Manxodidi, A Wensley¹ and FM Uys²

Emanti Management, Stellenbosch, 7599, South Africa

¹Water Services Directorate, Department of Water Affairs and Forestry, South Africa

²School of Public Management, University of Stellenbosch, South Africa

Abstract

In almost all South African metropolitan areas, and those areas provided with water from the major water boards, the consumer is provided with high quality drinking-water. However, in the many small cities, towns and villages that fall outside these regions, the situation is very different and in most cases an unacceptably high incidence of poor drinking-water quality occurs. Furthermore, most Water Services Authorities fail to satisfy compulsory national standards for potable water which are an effective regulatory governance methodology for ensuring drinking-water quality. This paper provides legislative insight into drinking-water services provision, presents data from recent surveys into drinking-water quality, and looks at the role of governance at the three tiers of government in achieving safe drinking-water. Brief case studies demonstrating the efficacy of governance in positively influencing drinking-water quality are presented. Considerations as to the Way Forward are also provided, and it is noted that web-based data systems that provide transparency regarding drinking-water quality can be expected to contribute considerable towards ensuring continual improvement in the provision of safe drinking-water in non-metro South Africa.

1. INTRODUCTION

Of the many challenges inherited by the new South Africa, one of the more difficult and pressing challenges was that relating to the provision of adequate water services. Prior to 1994, an estimated 30-40% of South Africa's population (approximately 14 to 18 million people) was without adequate water supply services and some 21 million people were without adequate sanitation (Van der Merwe, 2003). Furthermore, in those rural areas where water supply existed, drinking-water quality was often poor and could not be considered safe. The resulting impact on primary health was (and remains) significant, with diarrhoea being responsible for some 25% of all deaths in the one to five age group (Bourne & Coetzee, 1996) and an annual estimated 43 000 deaths and 3 million incidences of illness, with an associated treatment cost of some R3.4 billion (Pegrum, Rollins & Espey, 1998). Not surprisingly, the water services sector received significant government attention, and the introduction of a new municipal system, new water policies and a new financial framework have resulted in landmark changes in the approach to water services delivery in South Africa.

In addressing this challenge, the Department of Water Affairs and Forestry (DWAF) introduced the concept of a "water ladder". The provision of access to a basic level of safe drinking-water is the first rung on the "water ladder", and as the ladder is climbed so people will experience better standards of supply and service (Kasrils, 2003). Progress achieved to-date has indeed been impressive, and as of 2004 some 10 million additional people have been supplied with access to drinking-water, thereby reducing the drinking-water supply backlog to some 4 million. As regards drinking-water, of critical consideration is the actual quality of the drinking-water being provided at point-of-distribution for consumption. Current investigations indicate that the actual quality of drinking-water is unacceptably poor, and furthermore that Water Services Authorities fail to comply with compulsory national standards for the quality of potable water.

This paper provides background on ruling legislative requirements, and then demonstrates by way of a series of abbreviated case studies how the introduction of both regulatory and co-operative governance within the different tiers of government (local, provincial and national) has been shown to bring about the delivery of safe drinking water in non-metro areas of South Africa. Insight into the challenges regarding roll out of such governance driven initiatives throughout South Africa's non-metro water services is also provided.

2. OVERVIEW OF LEGISLATION RELATING TO DRINKING-WATER SERVICES

The legal framework and institutional arrangements relating to water services provision is complicated and can be somewhat daunting even to the uninitiated. This section provides a summary thereof, with particular consideration as to applicability towards drinking-water quality.

2.1 Legal Framework

Since 1994 various pieces of legislation concerning the water and local government sectors have been finalised. The most important are:

- **The Constitution of South Africa**, 1996, assigns responsibility of ensuring access to water services to local government. The role of the national and provincial spheres of government is to support, monitor and regulate local government.
- **The Water Services Act**, 1997, further defines the municipal functions of ensuring water services provision
- **The National Water Act**, 1998, defines a new way of managing South Africa's scarce water resources. This Act states that water is an indivisible national resource for which national government is the custodian.
- **The Local Government: Municipal Demarcation Act**, 1998, provides a legal framework for defining and implementing a post-transitional system of local government.
- **The Local Government: Municipal Structures Act**, 1998, defines types and structures of municipalities. Three categories of municipalities exist in South Africa after demarcation: Category A (Metropolitan), Category B (Local), Category C (District).
- **The Local Government: Municipal Systems Act**, 2000, defines how local government should operate and allows for various types of partnership arrangements a municipality may enter into to ensure delivery of services for example water.
- **The Local Government: Municipal Structures Amendment Act**, 2000, places the function of ensuring access to water services (as well as Health and Electricity) at a district level, unless a local municipality is authorised to perform this function

2.2 The New Municipal System

The second democratic local government elections held on 5th December 2002 heralded the introduction of the new local government municipal system. The new system reduced the number of local government structures from 843 to 284:

- 6 metropolitan municipalities (Metros - 'Unicities' with no sub structures)
- 47 district municipalities covering the whole country; and
- 231 Local Municipalities located within the areas of the district municipalities.

A district municipality may typically contain three to six local municipalities. A local municipality usually includes two to three towns as well as surrounding rural areas.

The new local government structures are faced with many challenges, including amalgamation of old administrations, as well as the challenge posed by rural areas and parts of the former homelands. The division of powers and functions between district and local municipalities has been, and still remains, a major issue to resolve.

2.3 Institutional Arrangements for Water Services

The primary responsibility for water services provision rests with local government. In terms of Section 84 of the Municipal Structures Act, the responsibility for providing water services rests with district and metropolitan municipalities. However, the Act allows the Minister of Provincial and Local Government Affairs to authorise a local municipality to perform these functions or exercise these powers. The district (or authorised local) municipality is the Water Services Authority (WSA) as defined in the Water Services Act. There can only be one WSA in any specific area (that is, water services authority areas cannot overlap).

Duties of Water Service Authorities

WSA's have the following primary responsibilities:

- **Realisation of the right to access to basic water services:** ensuring progressive realisation of the right to basic water services subject to available resources (that is, extension of services), the provision of effective and efficient ongoing services (performance management, by-laws) and sustainability (financial planning, tariffs, service level choices, environmental monitoring).
- **Planning:** preparing water services development plans (integrated financial, institutional, social, technical and environmental planning) to progressively ensure efficient, affordable, economical and sustainable access to water.
- **Selection of water services providers:** selection, procurement and contracting water services providers (including itself).
- **Regulation:** of water service provision and water services providers (by-laws, contract regulation, monitoring, performance management).
- **Communication:** consumer education and communication (health and hygiene promotion, water conservation and demand management, information sharing, communication, and consumer charters).

A WSA may either provide water services itself (internal mechanism), or contract a WSP to provide water services (external mechanism). For an internal mechanism, the WSA must manage and account separately for the two functions. In practical terms this might mean that a municipal manager, acting on behalf of the municipality, contracts (as the WSA) with the manager of the water services department to provide water services in terms of a performance contract with the municipality. In the second case, the WSA must regulate the WSP according to the contract specifying clearly the allocation of roles and responsibilities between the regulator and the provider. Under all circumstances the WSA is the regulator of the service and is responsible to ensure that services are provided effectively, efficiently, sustainably and affordably.

Duties of Water Services Providers

The main duty of WSP's is to provide water services in accordance with the Constitution, the Water Services Act and the by-laws of the WSA, and in terms of any specific conditions set by the WSA in a contract. A WSP must publish a consumer charter which is consistent with by-laws and other regulations, is approved by the WSA, and includes the duties and responsibilities of both the WSP and the consumer, including conditions of supply of water services and payment conditions.

3. LEGISLATION RELATING TO DRINKING-WATER QUALITY

A useful and necessary means for tracking water services delivery is via the monitoring of the quality of drinking-water. Drinking-water quality monitoring allows the correct interpretation of simple and readily measurable analytical determinants gives insight into the operating state of water services provision, and draws attention to Operations and Maintenance requirements. Most importantly, drinking-water quality

monitoring is also necessary in that poor drinking-water quality has a direct impact on the health of the community. In South Africa, all Water Services Authorities are legally required to monitor drinking-water quality on a monthly basis. The Water Services Act introduced a compulsory national standard for drinking-water quality. The *Compulsory National Standards for the Quality of Potable Water*, as published in Government Gazette No 22355 of 8 June 2001, reads as follows:

Quality of potable water

5. (1) *Within two years of the promulgation of these Regulations, a water services authority must include a suitable programme for sampling the quality of potable water provided to consumers in its water services development plan.*
- (2) *The water quality sampling programme contemplated in sub regulation (1) must specify the points at which potable water provided to consumers will be sampled, the frequency of sampling and for which substances and determinants the water will be tested.*
- (3) *A water services institution must compare the results obtained from the testing of samples with SABS 241: Specifications for Drinking Water; or the South African Water Quality Guidelines published by the Department of Water Affairs and Forestry.*
- (4) *Should the comparison of the results as contemplated in sub regulation (3) indicate that the water supplied poses a health risk, the water services institution must inform the Director-General of the Department of Water Affairs and Forestry and the head of the Provincial Department of Health and it must take steps to inform its consumers-*
 - (a) *that the quality of the water that it supplies poses a health risk;*
 - (b) *of the reasons for the health risk;*
 - (c) *of any precautions to be taken by the consumers; and*
 - (d) *of the time frame, if any, within which it may be expected that water of a safe quality will be provided.*

The guiding drinking-water quality document is SABS 241-2001, specifies three classes of water in terms of physical, microbiological and chemical quality, as follows:

- Class 0: an ideal standard that is closely comparable to current international standards.
- Class I: water that is known to be acceptable for whole lifetime consumption.
- Class II: water considered to be maximum allowable for short-term consumption (usual and continuous daily consumption for periods not exceeding one year).

Class 0 is largely based on present first world standards such as those pertaining to the European Union and the United States of America; even South Africa's largest water boards will be hard pressed to satisfy Class 0 with regards to some of the determinants. **Class I** is known to be acceptable for whole lifetime consumption, and is therefore the objective of most South African WSAs and WSPs. **Class II** is an acknowledgement that, at present and for the foreseeable future, in many cases South Africa's piped drinking-water will not satisfy the previous existing Maximum Allowable Limit (Class I); and yet there is a risk to condemning as "unfit for human consumption" piped municipal drinking water that only marginally fails Class I and thereby driving consumers to a potentially worse quality and possibly "illegal" source. It is acknowledged that it is more prudent to allow consumption of the delivered drinking-water at a relaxed level for short-term consumption (Class II), where risk is quantifiable and understood and it is acknowledged that urgent actions are required to improve quality to Class I. Where water fails Class II, and in particular with regards to bacteriological quality, it should be regarded as unfit for human consumption and urgent attention and mitigative action is required.

Whilst the Water Services Act does not criminalise non-compliance with the national standards (and this is in keeping with the phased approach contemplated in the Water Services Act), the Water Services Act makes it an offence for any person to "fail or refuse to give information or to give false and misleading information when required to give information in terms of this Act". As such, as long as the WSAs comply with the preemptory obligation under Sub-regulation 5(4) above and inform, the Minister and the Province, as well as its consumers, of its inability to meet its obligations under the law, it faces a vastly reduced risk of incurring penalties under the Act.

Clearly, a regulatory governance requirement therefore exists for Local Government to monitor drinking-water quality, and for both Provincial and National Government to ensure that such is taking place. Where Local Government lacks resources to carry out such monitoring, a co-operative government requirement would require Provincial and/or National Government to ensure that monitoring takes place.

4. RECENT SURVEYS REGARDING DRINKING-WATER QUALITY

4.1 National Strategic Survey on Drinking-Water Quality

In order to determine the compliance by Local Government (LG) to drinking-water standards a Strategic Survey on Drinking-Water Quality was undertaken by DWAF's Chief Directorate: Water Services: Directorate Planning & Information (DWAF, 2004). More specifically the survey set out to determine the likely status of drinking-water quality management by assessing *drinking-water quality monitoring*, *service quality* and *service reliability*. The methodology used was one of "self-assessment" via a survey questionnaire. This approach has the benefit of providing insight as to how those tasked with service delivery perceive themselves, and how well they understand their roles, responsibilities and accountability. A referenceable cross-check review based on drinking-water quality analyses was also conducted to assess the relative accuracy of information presented via comparison with current field circumstance. Data from the Free State DLG&H monthly water quality audit and other drinking-water quality audits in the Western Cape and Eastern Cape were used to cross-reference the survey findings. This field experiences could then be used, in conjunction with the survey findings, to develop an appropriate strategy to improve drinking-water service delivery. 155 Municipalities were canvassed in the Strategic Survey on Drinking-Water Quality.

In determining whether acceptable water quality service delivery is occurring (see Table 1), the following assumptions were made regarding monitoring practises:

- a) Laboratories must be used for testing.
- b) Monitoring of water samples should be continuously carried out at several points within the water distribution system, documented and communicated as per the *Compulsory National Standards for the Quality of Potable Water*.
- c) Consumers should receive drinking-water of acceptable quality (satisfying SABS 241-2001 Class I).
- d) Monitoring of certain basic water variables should be undertaken regularly, and guidelines for these are specified by SABS 241-2001.

Table 1: Estimate of Local Municipalities (LMs) adhering to drinking-water quality issues

Province	Number of LMs	Number of LMs Complying	Percentage
Eastern Cape	25	5	20%
Free State	7	3	43%
Gauteng	9	5	56%
KwaZulu/Natal	34	13	38%
Mpumalanga	15	4	27%
Northern Cape	19	7	37%
Limpopo	14	7	50%
North West	11	8	73%
Western Cape	21	14	67%
South Africa	155	66	43%

Whilst the limitations of the Strategic Survey are clear, the findings of the Strategic Survey were found to have a good correlation with other initiatives, and to be in agreement on causative issues. Key observations included that LG are not familiar with drinking-water service requirements, and that inadequate monitoring of water quality results in services that regularly fail legislated requirements.

4.2 Western Cape Survey on Drinking-Water Quality

In the Western Cape, a Masibambane-DWAF project was carried out to assess the current status quo regarding drinking-water quality at all 24 non-metropolitan Water Services Authorities (Emanti, 2004) and included both:

- Interviews with technical directors (or delegated staff),
- Collection of drinking-water samples and testing of drinking-water quality at CSIR's SANAS accredited laboratory in Stellenbosch.

The objective of the survey was to use the information gathered to (a) assess the current status of drinking-water quality and (b) the quality of drinking-water services in the Western Cape. The outcomes of the study would be used to guide future assistance to Water Service Authorities (capacity, infrastructure, operation and maintenance).

Summary of Key Issues Identified from Interviews

The following key drinking-water issues were identified from the interview process:

- Most Local Municipalities are not sufficiently aware of their legislative and regulatory governance requirements regarding effective drinking-water service delivery
 - Lack of understanding of legislative requirements, water quality standards/guidelines, requirements for effective monitoring, etc
 - Service delivery to smaller towns/communities is not as effective and efficient as that in the larger towns of the same local municipality
- Inadequate monitoring (and associated pro-active management) of drinking-water services consistently results in drinking-water quality that fails legislated requirements.
 - Lack of drinking-water quality data
 - Lack of basic laboratory equipment
 - Drinking-water quality is not always ideal or good
 - Through monitoring water quality issues are identified
 - Accurate laboratory analysis is essential to enable informed decision-making
- Inadequate infrastructure management results in premature failure of drinking-water services.
 - Maintenance budgets are not adequate to ensure sufficient asset maintenance
 - Appropriate and sustainable technologies are not always implemented
- Present Water Service Authority institutional capacity (staffing, funding, expertise, education) is limiting adequate service provision.
 - Constant restructuring → staff stressed, demotivated, poor attitudes, no initiative
 - Staff numbers are not adequate; too many ghost posts
 - Skilled staff leave to higher paying jobs; away from small towns
 - Water Service Authorities have difficulty in attracting suitably qualified staff
 - Not sufficiently supported by LGWSETA in training and capacity building requirements

Summary of Water Quality Results from Once-Off Sampling

The drinking-water sampling programme was such that samples were collected at 1 major town, 2 smaller established towns, and 2 small communities within each district council of the Western Cape. In most instances, six treated drinking-water samples were collected in each town/community. Samples were collected at the water treatment works (where applicable) and at household taps throughout the water distribution network of the town/community. Samples were analysed for the minimum determinants as outlined in SABS 241-2001 Drinking-Water Specification, namely: total coliform bacteria, faecal coliform bacteria, electrical conductivity, pH, turbidity, appropriate residual treatment chemicals (iron, aluminium) and disinfectants (free chlorine residual). A summary interpretation of bacteriological drinking-water results as compared to SABS 241-2001 Class I standards (the required quality standard for WSAs) is shown in Table 2. **NOTE:** Bacteriological results give an indication of the potential risk of contracting waterborne diseases and as such can be considered to have a direct and acute health impact.

Table 2: *Western Cape bacteriological drinking-water quality results (February to June 2004)*

Western Cape February to June 2004	Total Samples	Total Coliform % Samples Failing	Faecal Coliform % Samples Failing
All samples	162	42%	19%
Major town samples	30	7%	0%
Smaller established town samples	94	41%	20%
Village/community samples	38	71%	32%
SABS 241-2001 Class I Allowable Compliance*		4% of Samples, Max	

*NOTE: Although the objective of disinfection should be to attain zero total coliform bacteria and zero faecal coliform bacteria, the SABS 241-2001 Class I allowable compliance is a maximum of 4% to have total coliform bacteria count greater than 10 per 100 mL and faecal coliform bacteria count greater than 1 per 100 mL.

The above table shows that:

- Significant failures with regards to both total coliforms (42% failure) and faecal coliforms (19% failure) were recorded at the towns/communities sampled (maximum 4% failure allowed).
- The percentage total and faecal coliform failure at villages/communities (71% and 32% failure respectively) was significantly higher than that recorded at the major towns (7% and 0% failure respectively).
- The percentage total and faecal coliform failure at smaller established towns (41% and 20% failure respectively) was also significantly higher than that recorded at the major towns (7% and 0% failure respectively).

Although not presented here, suffice to note that physico-chemical determinant analysis showed significant failures with regards to turbidity (33% failure) and iron (31% failure).

5. REGULATORY GOVERNANCE CONSIDERATIONS

Within the concept of co-operative government is also the recognition that performance by the different spheres of government (that is national, provincial and local) needs to be monitored and regulated. The functions of the various spheres of government with regards to regulatory governance are described briefly below.

- **Local Government** is an independent sphere of government which is assigned (by the Constitution) the executive authority for water supply and sanitation (water services). The WSA (municipality) is the local regulator of water services. It determines local policies and standards (which must conform to national minimum norms and standards), promulgates by-laws, plans the provision of water services (water services development plan), determines how investments in water services are undertaken and sets tariffs. Where the water services authority is also the water services provider, then there is self-regulation. The Strategic Framework for Water Services (DWAF, 2003) notes that the accountability of the WSA to the local electorate is an effective regulating mechanism for the provision of water services in this context
- **Provincial Government** is involved with regulation of water in accordance with the general principles of cooperative government. Provincial government also fulfils regulatory functions in respect of its other functions such as planning and control functions, as well as its broad mandate to oversee and assist local government. Provincial Government is tasked with directing national programmes to assist local government, such as the Municipal Infrastructure Grant and the Capacity Building Grant.
- **National Government** is both the sector leader and the overall regulator of the sector. National government regulates through DWAF. In the broadest sense, regulation aims to ensure that all role players comply with all the regulatory goals, objectives and measures in respect of the

economic, social, political, environmental and technical desirables as provided for in all relevant policy and legislation.

In essence, national and provincial government are therefore obliged to support and strengthen the capacity of municipalities and holds regulatory authority to ensure effective performance by municipalities in respect of all functions. Although the above mandated responsibilities are well documented, the existing situation in South Africa is that regulation of drinking-water quality is generally poor. This has resulted that in many cases drinking water does not meet the required standards. In many cases Water Services Authorities are not familiar with the *Compulsory National Standards for the Quality of Potable Water*, and inadequate monitoring of water quality and/or inadequate interventions to address poor drinking-water quality results in services that regularly fail in the provision of safe drinking-water.

Considering the above, the ideal situation would be where a consistently safe drinking-water is achieved through adherence to legislation and good management practice by WSAs and the effective regulation thereof by DWAF. Provincial government should play a co-operative government and provincial regulatory governance role and assist WSA's to fulfill their obligations.

Furthermore, DWAF could introduce supportive measures towards WSA's such as the development of a national drinking-water quality management strategy; provide generic and appropriate drinking-water quality management systems for use by WSA's; maintain a database of the state of WSA monitoring systems; work to support the identification and verification of simpler and more affordable testing methodologies for WSA's and updating SANS 241 to include these. Finally, as sector regulator, DWAF should track and review the adherence of WSA's to their mandated requirements. Where there is lack of adherence to requirements, DWAF should intervene in proactive manner.

6. CASE STUDIES DEMONSTRATING THE ROLE OF GOVERNANCE IN IMPROVING DRINKING-WATER QUALITY

The following section presents two successful case studies where the implementation of fairly simple drinking-water quality management procedures has resulted in a significant improvement in drinking-water quality.

6.1 Self Regulation by the Water Services Authority

Stellenbosch Municipality is a Water Services Authority (WSA), and is part of the Boland District Council of the Western Cape. In 1997, Stellenbosch Municipality (as WSA) introduced a pro-active drinking-water quality management (DWQM) programme for the town of Stellenbosch. This DWQM programme provides the necessary self-regulation of the service Stellenbosch Municipality provides, and ensures that services are provided effectively, efficiently, sustainably and affordably. The programme includes the communities of Pniel, Johannesdal, Kylemore, Klipmuts and Franschhoek. At present approximately 90 samples are collected on a monthly basis from source, through treatment chain, reservoirs and distribution network to the consumers tap. These samples are analysed at CSIR's SANAS Accredited Analytical Laboratory in Stellenbosch. The following two historical case studies highlight successes achieved through the self-regulatory practices of Stellenbosch Municipality:

- During 2001, the town of Franschhoek was included within the areas of responsibility of Stellenbosch Municipality as WSA. An initial investigation at Franschhoek in October 2001 found that the drinking-water quality within the town was very poor, often failing SABS 241-2001 standards. In particular, it was noted that 95% of all samples collected failed required levels for total coliforms, while 88% of all samples collected failed required levels for faecal coliforms. Subsequent interventions resulted in 100% compliance with required drinking-water quality standards (see Figure 1) within a reasonable time frame.

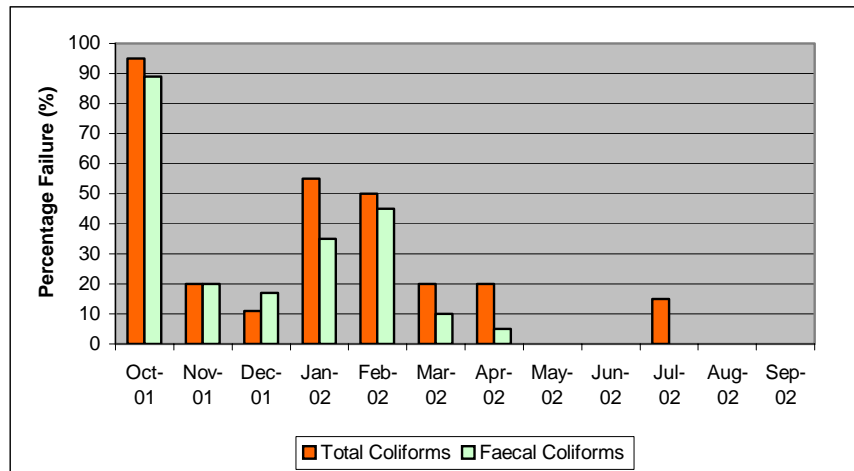


Figure 1: Franschhoek Year One: percentage failure of drinking-water with regards to SABS 241-2001 for Total Coliforms and Faecal Coliforms

- An investigation in 2002 of residual aluminium concentrations (following treatment where aluminium sulphate is used as a coagulant) revealed that aluminium concentrations in excess of the SABS 241-2001 Class I (Acceptable) Limit of 0.3 mg/L (and sometimes in excess of the SABS 241-2001 Class II (Maximum Allowable) Limit of 0.5 mg/L) were recorded in those reservoirs receiving water from the Paradyskloof Water Treatment Works. Subsequent interventions resulted in 100% compliance with required drinking-water quality standards (see Figure 2) within a reasonable time frame.

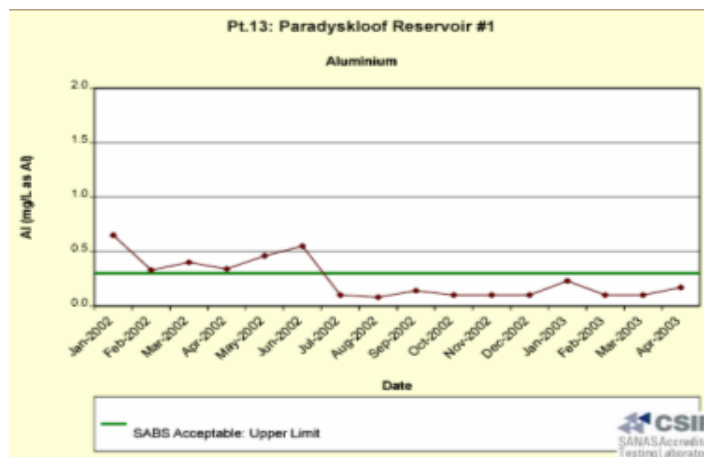


Figure 2: Aluminium residual monitoring at Paradyskloof Reservoir #1, Stellenbosch

The above simple examples show the powerful value of adherence by a WSA to the *Compulsory National Standards for the Quality of Potable Water*. Without adherence thereto, and the associated monitoring, the above problems would not have been detected, and required remedial actions would not have been implemented. Consumers would therefore have continued to be exposed to water which could potentially have a serious impact on public health.

The costs of such DWQM programmes should be considered in terms of both price charged for drinking-water and with a realisation that providing safe drinking-water is a primary health issue and a legal requirement. Stellenbosch Municipality’s DWQM monthly sampling and report costs are approximately R35 000-00; this translates to only about 2,5 percent of sale price (i.e. R0.05/kL of a water sold at R1.90/kL). Total quality control cost, including departmental inputs forms less than 5% of the total water

account in Stellenbosch.

The above costs are placed into perspective when one considers the value the DWQM programme delivers to the client. This value is readily assessed using a quantitative technique, termed “Value Impact Assessment” (using a Net Present Value (NPV) approach). The NPV assessment captures both the costs and income (or benefits) arising from a project, and relates these as one financial sum in terms of today’s money. If the NPV is positive, the Value Impact to the client is positive by the amount of the NPV. In the assessment conducted for Stellenbosch Municipality both improvements in operational efficiency (reduction in treatment costs, optimisation of chemical addition, and reduction in pipe bursts) and personnel efficiency (reduced manpower requirements via improved efficiency of network management and water treatment processes) were considered (Moorgas, 2004). Using various inputs for operating and maintenance costs, DWQM programme costs, inflation, risk, etc cash flows were developed which were then translated into a Net Present Value for Stellenbosch Municipality). Using a Monte Carlo simulation technique (with 300 NPV simulations) a frequency distribution was developed.

The Value Impact Assessment results showed that it was highly likely that DWQM related efficiencies would result in substantial savings to Stellenbosch Municipality (as indicated by the highly positive NPVs). Importantly, the distribution showed that there was no probability that a negative NPV would result. That is to say, at all times the DWQM service at least pays for itself; and in likelihood delivers an attractive positive NPV to the client. For the purpose of debate, even discarding expected benefits from the DWQM programme, the cost of the consultative auditing process that assures the drinking-water quality of Stellenbosch translates to R5/person/year or R0.42/person/month. A very nominal price indeed for ensuring the delivery of safe drinking-water!

A current challenge faced by Stellenbosch Municipality is the expansion of the DWQM programme to smaller communities/hamlets within the municipal area but falling without the formal town boundaries (including Devon Valley, Faure, Lanquedoch, Raithby, La Motte, Wemmershoek, etc). A status quo assessment of these areas is currently underway. This assessment will assist Stellenbosch Municipality in deciding the required courses of action and guide the way forward.

6.2 Co-operative Governance: The Free State Water Quality Management Initiative

Whilst it is a non-transferable legislated responsibility of WSA’s (Local Government) to ensure the provision of adequate services, the supportive and regulatory role of Provincial and National government is crucial. The Free State Department of Local Government and Housing-Free State (DLGH) operate a far sighted co-operative government initiative to assist Local Government in the delivery of water services.

The basis of the initiative is a monthly Consultative Audit of both drinking-water and treated wastewater across all communities in the Free State (approximately 85 communities/towns/cities). During the audit, drinking-water samples are collected at both the water treatment works and at point of use in the distribution network, whilst treated wastewater samples are collected at wastewater treatment works. The collected water samples are analysed for various microbiological and physico-chemical parameters (depending on the water in question) utilizing internationally accepted methods. Water quality data is then collated, verified and interpreted according to required standards (e.g. SABS 241-2001, DWAF General Authorisation), which helps to identify issues of concern that require attention and highlights improvements made in service delivery. Water quality results are then presented/reported to local and provincial government via monthly fax reports; quarterly and annual reports and monthly, quarterly and annual feedback sessions. Through this audit, and despite a past general failure of WSA’s to carry out their own legally required DWQM programmes, a progressive and considerable improvement in drinking-water quality has resulted. Summarised results obtained for both the period 1st April 2002 to 31st March 2003 and the period 1st April 2003 to 31st March 2004 are shown in Table 3 below.

Table 3: Summary of bacteriological water quality- surface water based systems

Source	Total Analyses	Total coliforms Percentage Failure (i.e. > 5 per 100 ml)		Faecal coliforms Percentage Failure (i.e. > 0 per 100 mL)	
		2003	2004	2003	2004
Surface water based systems	1741	6.2%	3.4%	2.7%	1.9%
SABS 241-2001: Class I (Acceptable)	-	4% Maximum		4% Maximum	

The above table shows that:

- 3.4% of the 1741 drinking-water samples collected from surface water based systems failed required SABS 241-2001 limits for total coliforms, while 1.9% of the samples collected failed required SABS 241-2001 limits for faecal coliforms (a maximum failure of 4% is allowed).
- Comparison of the drinking-water results obtained in Year 2003 with that obtained in Year 2004 indicates that an improvement in bacteriological water quality has occurred with both the total coliform and faecal coliform percentage failures obtained satisfying SABS 241-2001 Class I (Acceptable) limit of 4% maximum failure.

These compliance figures are significantly better than other areas of the country (where such programmes are not operated – see section 4.2 above). As such, this programme is regarded as a national Best Practice. Importantly, DLGH are now using the Water Quality Management programme to:

- Guide WSA's to become legislatively compliant through the introduction of their own Water Quality Management procedures.
- Direct and assess infrastructural and capacity building support to Local Government, including funds from the Municipal Infrastructure Grant (MIG) and the Capacity Building Grant.

The monthly consultative auditing process for the Free State translates to approximately R1/person/year or R0.08/person/month. Again, this is a nominal sum indeed if it results in a significant improvement in drinking-water quality, and the associated Primary Health benefits.

A current challenge faced in the Free State is that despite considerable progress, serious problems still exist. At a number of municipalities, no progress has been made for periods exceeding six months. Through the introduction of an easily accessible web-based water quality management system (currently in progress), it is anticipated that clearer insights into water service delivery in the Free State will be provided. The web-based system will enable easy identification of issues and will assist with prioritization (ranking) of these issues. Once water quality data is accessible to all stakeholders via the internet, the onus will be on municipalities to provide evidence of steps attempted in trying to improve water service delivery and (if applicable) why these steps have not been successful.

7. CONCLUSIONS and WAY FORWARD

It has been shown that considerable national progress has been made since 1994 in ensuring the provision of adequate basic drinking-water services delivery (the first step up the "Water Ladder"). However, it has also been shown that most non-metro Water Services Authorities in South Africa are failing in their compliance with the *Compulsory National Standards for the Quality of Potable Water*, and that in many instances this failure in regulatory governance is resulting in the provision of drinking-water of unacceptably poor quality. A direct associated impact on Primary Health can be expected.

It has also been shown that implementation by Water Service Authorities of simple regulatory governance methodologies such as adherence to the *Compulsory National Standards for the Quality of Potable Water* via a simple, well-structured, sustainable DWQM programme will make considerable difference to ensuring the provision of safe, good quality drinking-water. It is further shown that, where Water Service Authorities lack capability, a provincially based co-operative government programme such as that of the Free State, results in considerable improvement in drinking-water quality. In determining the way forward and ensuring sustainable progression up the Water Ladder (i.e. ongoing improved standards of

supply and services), the following multi-pronged approach can be considered:

- Special efforts need to be made by WSAs to become legally compliant with regards to the compulsory standards
- Provincially based Consultative Audits of drinking-water quality provided by WSA's should be introduced; and used to both intervene in acute and chronic drinking-water failures, and to direct provincially based national assistance programmes such as the Municipal Infrastructure Grant and the Capacity Building Programme.
- National Department of Water Affairs and Forestry (as sector leader and sector regulator) needs to create a supportive environment for improved services delivery by Water Services Authorities and also act effectively as overall sector regulator, intervening in those cases where the aforementioned initiatives are not sufficient to ensure the delivery of safe drinking-water.

Finally, it can be expected that any initiatives that provide transparency regarding drinking-water quality to consumers and other stakeholders (such as user-friendly web-based reporting systems) will contribute greatly to a cycle of continuous improvement with regards to the delivery of acceptable drinking-water quality in the non-metro areas of South Africa.

8. REFERENCES

1. Bourne, D.E. and Coetzee, N. An Atlas of Potentially Water-Related Diseases in South Africa. WRC Report No 584/1/96, Pretoria, South Africa (1996).
2. DWAF. Guidelines for Compulsory National Standards – Regulations under Section 9 of the Water Services Act (Act 108 of 1997) (2002).
3. DWAF. Strategic Framework for Water Services (September 2003).
4. DWAF. Advertorial – Water, Sewage and Effluent Volume 24 No. 3 pp 64 – 65 (May 2004).
5. DWAF, Chief Directorate Water Services. Survey Report on the Quality of Water Services in Local and Metropolitan Municipalities (12th May 2004).
6. Emanti Management (Pty) Ltd. Drinking-Water Quality Management System for the Western Cape. Submitted to Stellenbosch Municipality for Masibambane Western Cape (July 2004).
7. Kasrils, R. Media Release: Statement by Minister Ronnie Kasrils on the Celebration of the 9 millionth person to receive safe water since 1994 (5 July 2003).
8. Moorgas, S. Personal communication (2004).
9. Pegrum, G.C., Rollins, N. and Espey, Q. Estimating the cost of diarrhoea and epidemic dysentery in KwaZulu-Natal and South Africa. Water SA Volume 24 No 1 (1998).
10. SABS: South African Bureau of Standards. SABS 241-2001: Specification for Drinking Water. Pretoria, South Africa (2001).
11. Van der Merwe, L.H. Water Sewage and Effluent Volume 23 No. 5 pp 50 – 51 (September 2003).