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**Water Quality Management
Series**

**Policy Document
U 1.2**

Managing the Water Quality
Effects of Settlements: -

The National Strategy

First Edition

Department of Water Affairs and
Forestry

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PREFACE

The current approach to global environmental management recognises that development, poverty and protection of the environment are intimately linked. This is particularly true for the poorer countries, where the need for economic development is so great. This need to balance environmental protection with development was central to the deliberations at the Rio Earth Summit, which gave rise to the Danish Environmental Protection Agency's DANCED program (**DAN**ish **Co**-operation for the **En**vironment and **De**velopment). DANCED, therefore, focuses on providing support to developing countries to ensure that growth and development can occur in an environmentally sustainable way.

DANCED funding for this project was intended to allow the development of a strategy to address the pollution problems associated with the more densely populated urban and peri-urban settlements. Pollution problems in these settlements are primarily a result of inadequate or poorly maintained and used services. These settlements had also suffered from the inequitable distribution of services under the previous government. As such, while the primary intention of the strategy is to focus on the water quality (or water environmental) effects of these settlements, implementation of the strategy clearly supports the process of redressing the imbalances inherent in South African society. As such this strategy forms part of the South African Government's ongoing commitment to improve the quality of life for the majority of its citizens.

DOCUMENT INDEX

This document outlines the Department of Water Affairs and Forestry's National Strategy for Managing the Water Quality Effects of Densely Populated Settlements. It represents the final output of a project that was jointly funded by the Department of Water Affairs and Forestry and the Danish Government via their DANCED program. The Project started on 1 June 1997, and has been completed in two phases: - Phase 1 and a Bridging Phase. The project will continue into a Phase 2, which will serve to test the Strategy in a number of test cases.

This report combines the recommendations of a number of technical outputs of the project into *A National Strategy* that will be used by DWAF to address the water quality effects of settlements in South Africa. The reader is referred to these other outputs for more detailed information.

The Department of Water Affairs and Forestry reports in this series are: -

**Managing the Water Quality Effects of Settlements.
The National Strategy. Policy Document U 1.1**

Managing the Water Quality Effects of Settlements.
Guidelines for Implementation. Operational Guideline U 1.2

Managing the Water Quality Effects of Settlements.
A guide to problem analysis. Operational Guideline U 1.3

Working Towards a Clean and Healthy Community
An information booklet to support community efforts to minimise water pollution from their settlements.

The technical outputs produced to support the development of the Strategy include: -

Phase 1

An Overview of Status and Experience.
A Stakeholder Analysis.
A Proposal for a National Strategy.
Recommendations for Statutory Adjustments.
Recommendations for Organisational Adjustments in DWAF.
A Proposal for Awareness and Training Activities.
Draft Project Documents for Pilot Projects in two Settlements.

Bridging Phase

Guidelines for Managing the Water Quality Effects of Densely Populated Settlements.
An Evaluation of the Financial Consequences of Implementing the Strategy.
A Discussion Document (as input to a National Consultative Process).

Additional copies of this report, or other reports in this series, may be ordered from:

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FOREWORD

South Africa's Constitution not only places an obligation on the State to ensure an environment that supports the health and wellbeing of all South Africans, but also makes the Department of Water Affairs and Forestry responsible for managing the nation's water resources. As such, this Department must both ensure equitable access to water, and the sustainable use of our water resources.

Densely populated human settlements inevitably produce large quantities of waste. This waste, if left unchecked, can pollute rivers, streams and even groundwater resources. These problems are at their worst in the larger more densely populated settlements, many of which are poorly serviced. Unfortunately, many communities in South Africa are still labouring under the burden of an unjust past, and are unable to afford high levels of services, or to maintain those services that have been put in place. In some cases this has led to severe pollution of nearby surface and groundwater resources, and has impacted on the quality of life in these settlements. This threatens the sustainable use of our water resources. The Department of Water Affairs and Forestry must develop strategies to manage these impacts.

However, while the Department of Water Affairs and Forestry has the clear mandate to manage the country's water resources, the need to rapidly redress the inequities of the past forms the core of most of the policies and strategies of the new government. As such many Departments are actively engaged in forming and executing policies with respect to housing and services provision. The activities of these Departments will affect how my Department may manage pollution from settlements. The national and provincial Departments of Health must also set basic standards to ensure protection of community health. In addition, communities throughout South Africa at last can play a greater role in, and are actively engaging in, local decision making. My Department's policies not only require us to balance the need to protect the water resource with the need for development in the country, but also require active community participation in decision making. Management of the water quality impacts of densely populated settlements is therefore complex, and requires interaction with a number of other government agencies as well as the affected communities.

The Department of Water Affairs and Forestry consequently initiated the first phase of a study that, together with a National Consultative process, produced a series of documents. These documents propose both the Department's overall approach to, and methodology for managing the water quality impacts of residential areas in the country. As such, these documents outline the Department's Strategy towards managing pollution from these settlements, and provide Guidelines to assist decision making at a local level. These documents have been drawn together from the technical outputs produced during Phase 1 of the study, as well as from comments received from stakeholders at a National Consultative Workshop, and represent the First Edition of the work.

Phase 2 of the project aims to test both the Strategy and Guidelines in a number of test cases, which will be used to further update and refine the approach the Department intends using. The Second Edition of the Strategy and Guidelines will draw on the experiences gained from these test cases. We therefore hope that these documents will continue to stimulate active debate, and readers are encouraged to feed their comments back to the Department.

Prof Kader Asmal MP
MINISTER OF WATER AFFAIRS AND FORESTRY

EXECUTIVE SUMMARY

1 Background

A great many South Africans live in settlements with inadequate, or poorly functioning, services. Pollution from these settlements has severe water quality implications for downstream water users, and for community health. Pollution from these settlements also impacts on the natural functioning of river ecosystems, which affects the sustainable use of the resource.

This report describes the DWAF's National Strategy to address this problem, and is structured as follows:-

- **Chapter 1:** Outlines the aims and structure of the report.
- **Chapter 2:** Outlines DWAF's water quality management policies, and how they will be given effect in this Strategy.
- **Chapter 3:** Outlines the causes of pollution from dense settlements, and how the Strategy proposes addressing these causes.
- **Chapter 4:** Outlines a "structured-facilitated" characterisation process which is used to identify and prioritise appropriate management interventions in any settlement.
- **Chapter 5:** Outlines the steps required to proactively implement the Strategy in the planning process, and the stakeholders involved in this process.
- **Chapter 6:** Outlines the financing arrangements that will affect implementation of the Strategy.
- **Chapter 7:** Presents the National Strategic Process, which is aimed at creating a suitable policy and implementing environment for the Strategy among all stakeholders.

2 Water Quality Management Policy

DWAF's current policies with respect to water resource protection have been given effect by the National Water Act. This Act must underlie the Strategy. This means that:-

- The Strategy is compatible with DWAF's developing *Water Resources Management* strategy, and with the principles of Integrated Catchment Management.
- The Strategy balances the need to protect the resource, with the need to develop, and service settlements in a financially sustainable manner.
- The *Water Resource Classification System* and *Resource Quality Objectives* underlie implementation of the Strategy.
- The Strategy makes provision for managing pollution from dense settlements within the established hierarchy of waste prevention, waste minimisation and impact minimisation.

3 The Legal and Constitutional background

South Africa's Constitution identifies water resource management as a national competency, but environmental protection and pollution management as Provincial, Local Government, or joint competencies. As such, management of the pollution problems of settlements may be considered a local and provincial government competency. However, the Constitution allows for the development and implementation of national approaches, specifically where these are necessary to protect the environment, or where national uniformity is required. This allows for the development of this Strategy at a national level.

Nevertheless, the lack of a clear delegation of environmental responsibilities, and the delegation of key competencies in this field to Provincial and Local Government, means that co-operative governance is important when implementing the Strategy. Similarly, the Strategy advocates integration with the IDP process, and with the formulation of Water Services Plans.

4 What are settlements?

“Settlements” include all areas of human habitation, ranging from formal urban settlements - to informal urban and rural settlements- to single farm dwellings. This Strategy is appropriate for all these residential areas, but the recommendations largely focus on poorly serviced, densely populated urban and peri-urban settlements. Large-scale industrial and commercial activities are not included in the Strategy.

5 A pollution continuum

Water quality problems arise where wastes that are generated in the settlement reach the surface or ground water resource, or where destruction of the riparian zone and river habitats occurs. This is represented by a conceptual continuum, whereby wastes are *Produced* in the settlement, are *Delivered* to the surface and groundwater resource, are *Transported* through the water resource, and lastly they impact on the *Use* of the water. Pollution management in settlements must concentrate on managing the *Production* and *Delivery* of waste, but management of the *Transport* and *Use* components can be considered in emergency situations.

6 Four Waste Streams

Wastes from dense settlements are associated with four waste streams; 1)sewage waste, 2)grey (or sullage) water, 3)stormwater and 4)solid waste (or litter). These waste streams interact, for example litter may block sewerage systems or stormwater conduits. Pollution management must therefore aim at all these waste streams. The level and operation of the services in these waste streams determines how much of the waste is safely disposed of.

7 The effect of size, density and siting

The size, density and siting of the settlement largely determine the risk to the water environment. As settlement density increases, the amount of waste *produced* per unit area increases and the natural assimilation of waste during the *delivery* process decreases. In very dense settlements pressure for land encourages movement into the riparian zone with shorter delivery pathways and riparian habitat destruction. There is also often an imbalance between the levels (and operation) of services¹ which remove waste from the settlement, and the amount of waste produced. At a certain point wastes start accumulating in the settlement and it becomes increasingly necessary to remove wastes from the settlement for safe disposal. The effects of size and density are exacerbated near sensitive water resources.

8 Finding the right balance

While size and density primarily determine the amount of waste produced and delivered to the water resource, the water quality impacts of the settlement are determined by the sensitivity or Class of the water resource. Balancing the impacts of development with the Water Resource Class is at the heart of water quality management policies. The Strategy, therefore, aims to find an appropriate balance between settlement size and density, the level and operation of services in the waste streams, and the Class of the water resource.

9 Three main causes of pollution

Poor operation, maintenance and use of services is the biggest cause of water quality problems, particularly in urban or peri-urban settlements. This is largely a function of the social and institutional conditions in these settlements. The key to sustainable management of pollution from settlements lies in addressing the *physical* causes of water quality problems, as well as the *institutional* and *social* problems underlying the poor operation and maintenance of the services.

¹ This refers to services that are in place to remove or address waste in the settlement. These include refuse and litter removal, stormwater and roads, sanitation and wastewater disposal, and water supply services.

More importantly, interventions must be appropriate to the community needs and must be financially sustainable.

10 Addressing pollution from settlements

Limiting the production of waste in dense settlements (*waste prevention*) is preferable, and should be considered as a first option. The amount of waste produced in the settlement is related to both its size and density and its socio-economic status. In settlements with a higher income level, limiting the amount of wastewater produced, for example, by implementing water saving schemes, may be possible. Similarly, recycling allows for waste prevention (or production management) and is effected by altering behaviour, and by capacity building.

Waste minimisation in dense settlements rests on limiting the amount of waste that can be delivered to the water resource, and is largely dependent on the level, appropriate use and operation of waste removal services. Waste minimisation requires services that are appropriate for the density and socio-economic status of the settlement, and that these services are well operated and maintained.

Impact minimisation is effected by management practices that trap and remove the waste once it has been mobilised in the delivery pathway. These practices include litter traps, detention ponds, interception drains and artificial wetlands. *Remediation* (or Transport and Use Management) can be considered in emergency situations.

11 Prioritising settlements for management

Prioritisation is based on the settlement's impact (or likely impact) on the water resource, and is determined by the form and extent of the water quality problem. This is done within the framework of the Water Resources Classification system and the Resource Quality Objectives. Settlements where the Resource Quality Objectives are being exceeded, or those near sensitive water resources (or planned near sensitive water resources²), should be addressed as a priority. Intervention within the Integrated Development Planning (IDP) process provides a proactive means of prioritising settlements.

Further prioritisation of settlements, or of the pollution sources in any settlement, is possible by identifying the dominant waste streams which contribute to the observed problems. This can be done by characterising the settlement (or planned settlement) in terms of its size, density and physical environment (slopes, soils, services etc.). This allows managers to focus attention on the most important waste streams in the settlement.

12 Identifying appropriate interventions

Settlements differ in terms of their *physical, social, institutional* and *natural environmental* characteristics, and it is difficult to suggest interventions³ that are suitable for all settlements. A "structured-facilitated process", whereby DWAF, the Local Authority and the community can jointly formulate appropriate interventions on a site-specific basis and is, therefore, used to identify interventions. This process is "structured" around identifying physical, social and institutional causes of pollution in each waste stream, and is "facilitated" by appropriately trained staff. This process allows stakeholders to firstly build an awareness of the problem within the affected community, as well as the motivation to address the problem. Secondly the process allows DWAF, the community and the Local Authority to get to the root cause of problems in each waste stream. Most importantly, this process helps stakeholders to address all the pollution problems in the settlement.

² This includes sensitive surface water (like areas with a high conservation value), and sensitive ground water resources (like dolomitic areas or near surface aquifers).

³ "Interventions" refers to intervening in the pollution process, and may be capacity and awareness building or be physical structures placed in the settlement.

However, the ideal of providing well operated, high levels of services to all is unlikely to be feasible. Appropriate interventions should consequently be first aimed at awareness and capacity building to ensure appropriate use and payment for the services. In addition, low cost service alternatives are advocated. Interventions should also recognise the water quality management hierarchy of waste prevention, waste minimisation and impact minimisation.

13 Capacity and awareness building

The capacities of the stakeholders in terms of their mandate, and their organisational, technical, financial and networking capacity, largely determine the sustainability of management practices. Community participation in the selection of appropriate interventions is therefore essential to the long-term sustainability of pollution management options. As such, capacity and awareness building within the community and Local Authority must back up physical interventions. Similarly, the role of women in the identification and implementation of interventions must be recognised.

Pollution management practices must also be linked to improved community health and living conditions in order to promote sustainability. This should be done via joint programs with the Provincial Health Departments, the National Sanitation Co-ordination Office and appropriate NGOs and CBOs, and should aim to create ownership of the interventions and their water quality benefits.

14 Intervening in the planning and servicing of settlements

DWAF may intervene in the planning, policy formulation or servicing of dense settlements in a number of different ways:-

1) *Influence :*

This entails building a common understanding with other stakeholders with respect to managing the water quality effects of settlements, and is aimed at voluntary commitment of resources. Influence should be the first type of intervention to be considered.

2) *Co-operative Governance:*

This entails the formulation of committees, which have executive and decision making powers, with other government agencies in all three spheres of government. DWAF may participate in existing processes, or may initiate new processes that address the planning, servicing or financing of settlements in an environmentally sustainable way. Co-operative governance would typically follow influence.

3) *Regulations:*

Regulations may be the final step of the co-operative governance process. Regulations focus on establishing standards and funding mechanisms for managing the water quality effects of settlements. These place greater obligations on stakeholders to implement interventions, and may be written as municipal bylaws, or as national regulations.

4) *Direct intervention:*

In exceptional cases DWAF may implement management practices under their own funding. This would be the last resort and would typically only be considered in situations where severe health-related water quality problems occur (e.g. cholera outbreaks), and where no capacity exists in the Local Authority. DWAF may recover these costs from the relevant Local Authority.

15 Financing interventions

While there are no financing mechanisms specifically aimed at pollution management in settlements, significant capital grant funding is being focused on the development, upgrading and servicing of settlements - particularly for the poor. Funding for interventions should tap into these sources where-ever possible.

However in many cases, particularly in the more densely populated - poorly serviced settlements, communities are unlikely to be able to afford the operation and maintenance of higher levels of

services. In these cases the interventions should aim to close the gap between the costs of operating and maintaining the services (by selecting lower cost options), and the cost recovery (by advocating payment for services). It is nevertheless recognised that in most cases a cost recovery gap is likely to remain. This recommends the implementation means to help fund the operation and maintenance of services in poorer settlements.

This may be done by firstly prioritising spending at a local level and secondly by identifying functions from outside the settlement. These issues need to be discussed with other government departments specifically charged with the planning, servicing and financing of settlements.

16 The core of the Strategy

The Strategy to address pollution from densely populated areas has two distinct components.

- 1) **Implementation of interventions within any settlement.** In this process DWAF Regions would directly engage Local Authorities and communities within the structured-facilitated process to identify pollution problems (or potential problems in the planning stage) in settlements, and then to jointly identify solutions to these.
- 2) **Implementation of a National Strategic Process,** which involves influence over, co-operative governance with, and eventually joint policy formulation with other government agencies involved in the planning, financing and servicing of settlements. The aim of this process is to create a suitable executing environment for the local implementation of the Strategy.

17 Conclusions

A number of issues are considered to be critical to ensure the sustainable implementation of procedures to manage the water quality effects of settlements. These are listed below.

1. The Strategy must be founded on balancing the need to protect the water resource with the need to rapidly develop, service and upgrade settlements.
2. The levels of service, management practices and interventions should be appropriate for the size and density of the settlement, and for the receiving water class. But that care should be taken not to recommend services which will not be maintained or operated effectively.
3. Management in any settlement must focus on the Physical, Social and Institutional factors which contribute to the water quality effects of dense settlements.
4. Management should focus on the processes that result in the Production and Delivery of waste in settlements, and on the relevant waste streams.
5. The structured-facilitated process should be used to determine which management practices, services and interventions are viable for the settlement.
6. Dialogue between DWAF-WQM, affected communities and local and provincial government is essential.
7. Capacity and awareness building, and community participation is critical to the sustainability of the management practices. In many cases little or no physical intervention may be needed, and management could focus predominantly on the "softer" issues where-ever possible.
8. A holistic approach to the problem in terms of both physical interventions and capacity and awareness building is critical.

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DEFINITIONS OF TERMS

“Inadequately Serviced Settlements”

This refers to any settlement where the levels and operation of services (or management practices) in place to manage the delivery of waste to the water environment are inadequate to deal with the amount of waste produced in the settlement. These settlements are often typified by water quality problems, which are in turn a function of the sensitivity (or Class) of the receiving water environment. (Due to South Africa’s apartheid history many of the traditionally black settlements are “inadequately serviced”, and these are the primary focus of this Strategy.)

Institutional Capacity

This is defined in its broadest sense as including the agency’s mandate, legislative instruments, organisational capacity, technical capacity (human resources, problem solving capacity and information systems), financial capacity, procedural capacity (policies, manuals, guidelines, codes of practice), and networking capacity (associations with other stakeholders).

Intermediate Levels of Services

This refers to levels of services that are higher than the RDP levels of a VIP and a standpipe within 200m, but which do not entail the costs (operational and capital) of fully reticulated conventional levels of services. These provide additional protection for the water resource in settlements where the affordability is low.

Interventions

This refers to actions that intervene in the processes that result in pollution. These may be physical problems, or related to community behaviour and institutional capacity. Interventions include both engineering services and best management practices, as well as capacity and awareness building activities within the affected communities and the service provider.

LOFLOS

This refers to Low Flow On-Site sanitation systems. These require low water volumes, and are situated on an individual’s property (i.e. via a septic tank or soakaway). They provide a flush option in areas where water supply may be a problem, or where greater protection for the groundwater is required.

Management Practices

This is limited to physical or engineering structures that are usually put in place to trap and remove the waste before it reaches the water environment. Examples include wetlands, stormwater detention ponds and litter traps.

On-plot

This refers to sanitation systems that are placed within an individual property boundary, and include systems like VIPs, Septic Tanks, and French drains.

Off-site

This refers to sanitation systems that remove sewage waste from the settlement for disposal or treatment elsewhere.

On-site

This refers to systems that are located within the boundaries of the settlement, usually serving some 20-30 dwellings, and includes communal systems.

Services

“Services” refers to those municipal or regional council services that are in place to remove or address waste produced in the settlement. These include refuse and litter removal services, stormwater and roads, sanitation and wastewater disposal services, and water supply services.

Settlement

This refers to any residential area, ranging from single farm dwellings to high rise blocks of flats. It includes both wealthy and poor areas, but excludes large scale commercial and industrial activities. The term includes all those activities that are normally associated with human residential areas. This includes small-scale informal commercial activities, as well as agricultural activities required for community food security.

Sewage

This refers to human faecal contaminated wastewater, typically wastewater discharged from the toilet or seeping from pitlatrines, but also includes wastes excreted direct to the environment by “bush toileting”. Sewage also refers to waste that may reach the environment from blocked or malfunctioning sanitation systems.

Sewerage

This refers to the infrastructure utilised to remove wastewater from the toilet, e.g. latrine pits, plumbing pipework, reticulation pipework and mains, pump stations and treatment works.

Social effects

This refers to the complex interaction of community history, behaviour, socio-economic status, political influence, demographics, employment, and vandalism, which determine how the community uses and pays for services.

Solid Waste

This refers to the non-hazardous solid matter from households. It does not include wastes from substantial industrial and commercial activities, but may include wastes from small backyard commercial establishments within the settlement.

Stormwater

This refers to the rainfall run-off from a storm event. Stormwater from dense settlements is typically collected via a stormwater drainage system associated with the road system and discharged to the receiving waters, usually without any form of treatment. Stormwater may be discharged with domestic sewage in a “combined sewerage system”.

Sullage

This refers to domestic wastewater discharged from the household that is not contaminated by faecal matter, e.g. wastewater from the bath, sinks, cooking and food preparation facilities. It may be combined with the sewage stream and discharged from the household as domestic “wastewater”. Sullage water may contain faecal pathogens from bathing.

VIP

A Ventilated Improved Pit Latrine (“VIP”) refers to a basic sewerage system with moderate capital costs and low O&M costs and consists of a superstructure to house the toilet arrangement and a deep, ventilated pit to collect faecal matter and minimise odour and insect nuisance. The system is typically operated on a dry basis, i.e. with no sullage disposed to the pit and limited flushing of the toilet; the pit normally has an unlined bottom to facilitate drainage of liquids. However the pit may have lined or unlined walls or floor. The pit is emptied on a 2-5 year basis by specialised sludge pumping equipment, but recent innovations have aimed at the application of local pit emptying equipment.

Wastewater

The term domestic “wastewater” refers to either sewage or sullage or their combination.

1 INTRODUCTION

1.1 DWAF's mandate

South Africa's Constitution gives the Department of Water Affairs and Forestry (DWAF) the mandate and the responsibility to manage the country's water resources. To do this, DWAF must not only ensure the equitable distribution of water to all South Africans, but must also protect the water resource for future generations. This requires both protection of the resource from over exploitation, and protection of the quality of the resource. Only by addressing both these issues can the Department achieve its vision of: -

"Ensuring some for all, forever"

DWAF, and in particular the water quality management function of the Department, must therefore develop strategies to protect the nation's water resources from the impacts associated with all human activities.

This report outlines DWAF's *National Strategy* for Managing the Water Quality Effects of Settlements. This report is supported by the:-

- *Volume 2: Guidelines for Implementation*, which outline potential options to address problems
- *Volume 3: A guide to problem analysis*, which builds the capacity to implement the Strategy at a local level, and
- *A community orientated document*, which builds capacity in communities to actively engage the structured-facilitated process.

1.2 The aim of this report

The aim of this report is to outline the Department's approach for managing pollution from densely populated settlements throughout South Africa. The report outlines;

- The Department's policies toward water quality management, and how the Strategy gives effect to these policies.
- How DWAF will balance the need to protect the water environment, with the need to address the backlog in housing and services in South Africa.
- How appropriate interventions¹ may be identified to address pollution from different settlements.
- What stakeholders are, or should be, involved in this process, and
- The steps DWAF will take to develop a common vision of the need to manage the water quality impacts of densely populated settlements amongst these stakeholders.

The report addresses both a *National Strategic Process*, which outlines how DWAF will engage other national government departments to develop a common approach to managing pollution from settlements, and how pollution problems may be identified and addressed in any individual settlement.

This document is **not** intended to outline procedures for the provision of services to settlements, or to provide a detailed procedural guide on how to identify appropriate interventions for any settlement. These details may be found in Volumes 1 & 2 this series.

¹ "Interventions" refers to interventions in the pollution process, and may include any action that may be necessary to reduce pollution from settlements. The term includes both engineering services, capacity building and education activities.

1.3 Who should read the report?

This document is primarily intended to outline DWAF's approach towards managing pollution from densely populated areas. The document is, therefore, aimed at: -

- ⇒ *DWAF regional water quality staff* to: -
 - promote an understanding of the causes of pollution from dense settlements,
 - outline how settlements may be prioritised for management attention, and
 - indicate how appropriate interventions may be identified and implemented.
- ⇒ *DWAF head office water quality management staff* to:-
 - outline the Department's policy with respect to managing pollution from settlements
 - outline a procedure to develop a common understanding with other stakeholders to promote the implementation of the Strategy on a national basis.
- ⇒ *Agencies associated with the planning, development and servicing of settlements* to:-
 - Indicate DWAF's intentions with respect to this problem
 - Promote the implementation of the Strategy outside of DWAF

1.4 The structure of the report

The report has been structured as follows: -

- Chapter 2:-** Outlines the need to develop the Strategy, provides a background to the water quality management policy environment, and outlines the philosophy that underlies the Strategy.
- Chapter 3:-** Outlines the causes of pollution from settlements and DWAF's overall approach to addressing these causes.
- Chapter 4:-** Outlines the structured-facilitated process which is used to identify appropriate interventions in any settlement.
- Chapter 5:-** Outlines how the strategy may be proactively implemented in the planning process.
- Chapter 6:-** Outlines the financing environment which will influence the implementation of the strategy.
- Chapter 7:-** Outlines a National Strategic Process to facilitate implementation of the Strategy on a national basis.

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This type of text block draws the reader's attention to key issues, important conclusions and recommendations.

2 BACKGROUND TO THE STRATEGY

Chapter 2

Outlines DWAF's approach to water quality management and managing the impacts of settlements. The chapter: -

- Discusses why pollution from settlements should be managed.
- Outlines DWAF's policies with respect to water resource and water quality management.
- Describes what is meant by "inadequately serviced settlements".
- Outlines the principles which guide the Strategy, and
- Describes the legal and Constitutional basis for the Strategy.

2.1 Why develop the Strategy?

Any human activity produces waste, but where population densities are high, a large amount of waste is produced in a small area. If this waste is not safely disposed of, it can accumulate in the settlement where it poses a health risk to the community. This problem is so prevalent in developing countries, that the World Health Organisation rates poor sanitation and water quality as the leading causes of illness and death in these countries. World-wide some 15 000 deaths per day are associated with poor water quality and inadequate sanitation and in South Africa as many as 43 000 deaths per year are caused by diarrhoeal diseases associated with inadequate and failing sanitation. Some 4 billion Rand per annum has been attributed to treatment of these problems.

Waste that accumulates in the settlement can also be carried into nearby surface and ground waters, and water resources near densely populated, poorly serviced, settlements are often severely polluted. This increases the costs of treating water to potable standards, and water treatment authorities indicate that the costs of treating polluted water downstream of dense settlements are significantly higher. The World Bank reports that, in some cases, water abstraction points have had to be moved at great expense to sites upstream of polluting settlements.

Pollution from densely populated, and inadequately serviced, settlements also impairs the use of downstream water resources for a variety of other users. Pollution from these settlements increases the health risks for recreational users of water bodies, increases the risks for livestock, and impairs use of the water for irrigation purposes. The natural functioning of the water environment, on which all humans ultimately depend, is also severely impaired by pollution from poorly serviced settlements. River systems downstream of these settlements lose some of their natural ability to assimilate wastes, and are typified by a lower biodiversity.

Many South Africans live already in poorly serviced settlements. Given the rapid urbanisation typical of most South African cities, and the backlog in services in many of our poorer communities, this problem is likely to grow into the future. Clearly, the health of the community as well as the quality of life in these settlements is closely tied to the safe disposal of waste generated in the settlement and the maintenance of a healthy aquatic environment. The implementation of procedures to address pollution from these settlements is, therefore, one of the most urgent needs facing this country.

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The health and economic impacts of pollution from densely populated settlements, and the extent of inadequately serviced settlements in South Africa, makes this one of the most important water quality management needs in South Africa.

2.2 Water quality management policies in South Africa

DWAF has both the responsibility and the accountability to manage the quality of South Africa's water resources. The Department has consequently invested considerable resources in the ongoing development and revision of its water quality management policies. These policies govern water quality management activities in the Department and underlie and dictate DWAF's actions in terms of this Strategy.

While DWAF recognises that it is impractical to maintain a pristine water environment, economic growth and social development can not take place at the expense of the environment. The current approach to water quality management, therefore, requires balancing protection of the water resource with the need for development and growth in South Africa. This balance can only be found given active public participation in water quality management. DWAF's policies consequently make special provision for public participation in the process establishing water quality management goals and strategies.

Within the ambit of these overarching principles, DWAF proposes a precautionary approach to water quality management. This means that positive actions should be taken to avert or minimise the risk of impacts on the water environment, even when these impacts can not be directly proven. This means that water quality management decision making follows a hierarchy of:-

- **Firstly, preventing or minimising waste** through reduction at source. This is done by reducing the amount of waste produced by recycling, neutralisation or detoxification of wastes. (i.e. Waste prevention and Waste minimisation)
- **Secondly, reducing the amount of waste, which reaches the water resource** by establishing effluent standards, or management practices that trap and remove the waste before it reaches the water environment. (Impact minimisation)
- **Lastly, exemptions from effluent standards or management practices** only where it can be shown that the receiving water's fitness for use will not be significantly reduced.

DWAF has also recognised that the quality of our water resources has deteriorated over the last few decades. South Africa must consequently move towards a set of standards that provide greater protection for the water resource. By implication, new sources of pollution may be required to meet more stringent standards.

2.3 The National Water Act

2.3.1 Water Resources Management Strategies and Water Management Areas

The National Water Act makes provision for the development of a *National Water Resource Strategy*, which will be given effect at a regional level by *Catchment Management Strategies*. As a first step in this process, DWAF has divided the country into 18 *Water Management Areas*. Water Resources Management Strategies will be developed for each of these areas. These will be supported by a number of cross cutting strategies addressing different aspects of water resources management. This Strategy focuses on addressing pollution from one source type, densely populated settlements, and is one of these cross cutting strategies. As such it forms one of the building blocks of the Water Resources Management Strategies (see Figure 2.1).

2.3.2 Resource and Source directed measures

This Strategy forms part of the Department's overall Water Resources Protection Strategy. The Water Resources Protection Strategy rests on two legs: *Resource-* and *Source-*directed measures. Resource directed measures aim to set resource quality objectives within a *Water Resource Classification* system. This allows for different levels of protection for different

water resources. Sensitive receiving environments, like dolomitic groundwater resources, and rivers with a high conservation value will receive greater management attention, and pollution sources in these areas may be required to implement more stringent management practices. The National Water Act, *via* these resource-directed measures, places particular emphasis on protection of the water environment.

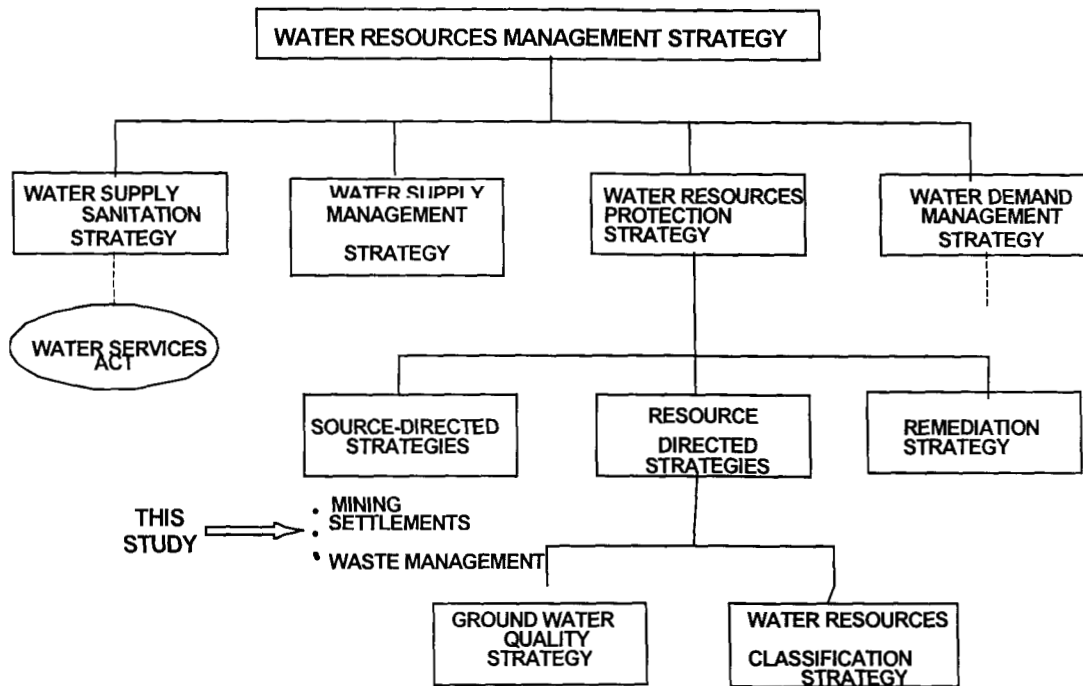


Figure 2.1. A representation of the positioning the Strategy may have within DWAF's overall Water Resources Management Strategy. This may be repeated in any catchment management strategy.

Resource Quality Objectives (RQOs) are aimed at specifying appropriate numeric and narrative objectives for different water resources. This is done in terms of the requirements of the “Reserve”, the Class of the water resource, and the needs of other users. The “Reserve” is that quantity and quality of water required to maintain the aquatic ecosystem and for basic human needs. The “Reserve” is the only use of water by right, and must get priority attention when managing water resources. The National Water Act requires that all water resources management practices and strategies must give effect to the RQOs, and to the *Water Resource Classification* system. These two approaches, therefore, underlie this Strategy. (It is recommended that the reader refer to more detailed policy documents in this regard).

The *Groundwater Quality Protection* strategy is another resource-directed strategy that has direct bearing on this Strategy. This aims *inter alia* to control on-site sanitation systems (mostly pit latrines) where geological conditions indicate a threat to the groundwater resource. This has significant implications for appropriate sanitation options in settlements, and directly affects implementation of this Strategy. (It is recommended that the reader refer to the Groundwater Protection Strategy in this regard).

Source-directed measures allow for the setting of standards (or management practices) that are appropriate for different pollution sources (defined in the National Water Act as “controlled activities”). These standards aim to *minimise* the impact on the water resource, and will be implemented using the precautionary approach and the decision hierarchy outlined in the previous section. The source-directed provisions, therefore, allow for the

setting of appropriate standards and methods to address both point and nonpoint source pollution from specified sources. This Strategy is one of these source-directed measures.

2.3.3 Moving from policy to practice

This Strategy is dictated by DWAF's dual resource- and source-directed approach toward water quality management, and will in turn dictate those interventions that are considered necessary to protect the water resource (Figure 2.2). However, current policy, as outlined in the White Paper on a National Water Policy for South Africa, also emphasises that this process must recognise the need to balance protection of the water resource, with the need for development in South Africa. This is particularly important for this Strategy, as the servicing and upliftment of the poor is a significant priority for all government agencies. As such the Strategy spans the gap between policy and interventions particularly with respect to managing pollution from densely populated settlements.

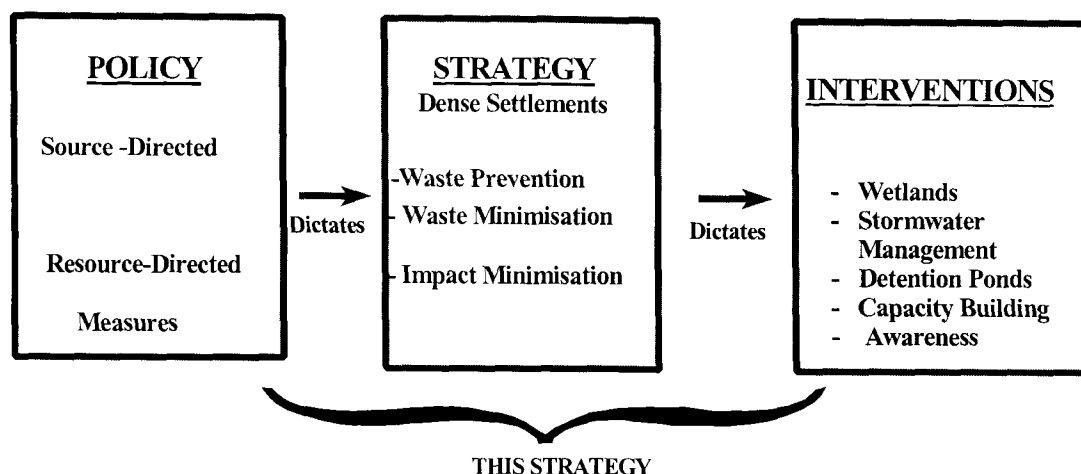


Figure 2.2 The process of policy, strategy and management practices showing the positioning of this Strategy.

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The Strategy to *Manage the Water Quality Effects of Settlements* must be consistent with DWAF's overall policies toward water resource management and water quality management. As such it must take cognisance of the Resource-Directed measures, and must balance protection with the need for development within the waste management hierarchy. The Strategy must also form one of the building blocks of Water Resource Management Strategies.

2.4 Finding the right balance

A settlement can refer to any area of human habitation, from single farm dwellings to high rise blocks of flats in city centres. However, small settlements, irrespective of how densely populated they may be, do not produce enough waste to have a significant effect on the water resource, although smaller localised problems may occur in or near these settlements, particularly if the receiving environment is sensitive. Sparse settlements, even if they cover large areas and include a great number of people, are also unlikely to create severe water quality problems, as open spaces allow for the natural breakdown of the waste before it reaches the water environment.

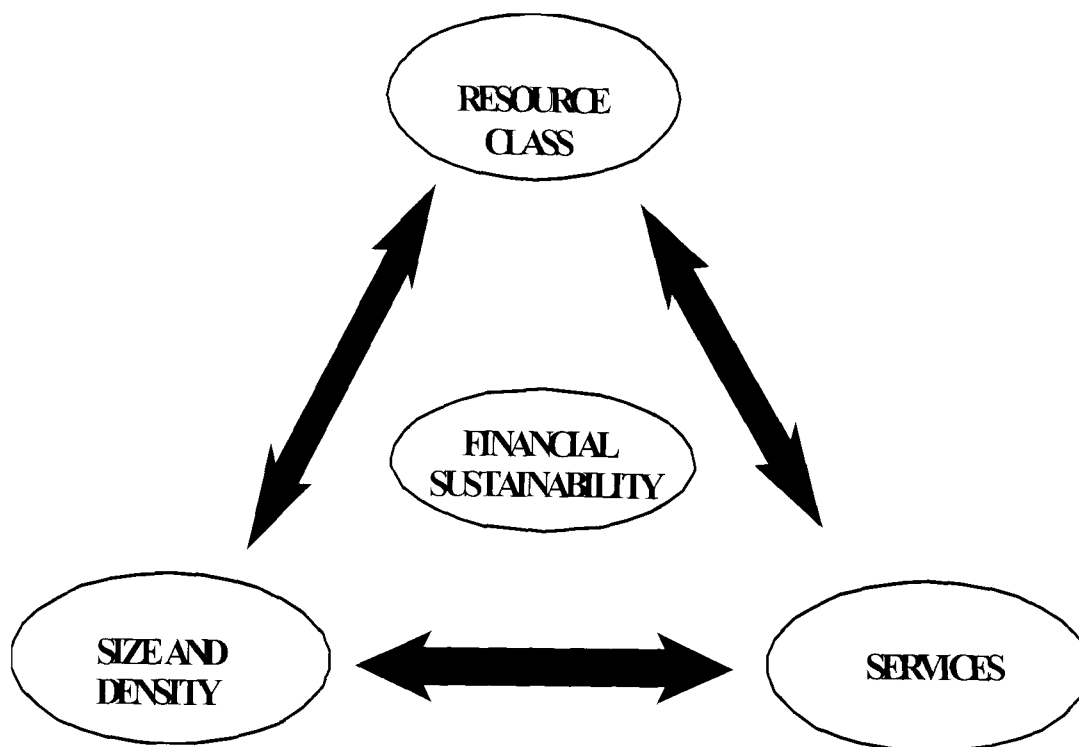


Figure 2.3 The factors that must be balanced to determine appropriate interventions in any settlement

However, large densely populated settlements produce more waste in a small area, there is less open space to break down and remove waste, and better (and better run) services are required to remove the waste for safe disposal. Where services are inadequate to safely remove this waste, or where they are failing, waste can accumulate in the settlement and it may be mobilised into nearby surface and ground waters. The size and density of the settlement is, therefore, one of the most important characteristics which determine the water quality impacts of the settlement.

The amount of waste produced in the settlement is also related to its socio-economic status. Wealthier communities produce more waste per household, but can pay for better services to remove and safely dispose of this waste. However, many of the wealthier settlements still have significant impacts on the water environment. Poorer communities while producing less waste per household often cannot afford high levels of service, and services in these areas are often poorly maintained. This is exacerbated, in the South African situation, by a history that resulted in an imbalance in the provision and maintenance of services. The most severe pollution problems tend to be associated with the poorer, mostly peri-urban and urban, densely populated settlements. These settlements remain the primary focus of the Strategy.

Water quality impacts can, however, occur in any settlement where the levels and operation of services, or management practices in place to trap waste, are inappropriate for the amount of waste generated in the settlement. These impacts are detected in the receiving environment, and are largely determined by the sensitivity (or Class) of the receiving water resource. This Strategy aims at identifying the appropriate balance between the Resource Class, the amount of waste produced (i.e. size and density), and the level and operation of services or management practices (Figure 2.3).

The Strategy also recognises that the resources available to address the services backlogs left by apartheid system are severely limited. This is often exacerbated by the continuing non-payment for services. The consequent lack of resources within local authorities to maintain higher levels of service is one of the most significant factors leading to pollution from urban

and peri-urban settlements. Financial and institutional sustainability of the services is therefore critical. The balance of resource class, size and density and services therefore rests on the fulcrum of sustainability (Figure 2.3).

Note:

Large commercial and industrial activities are known to result in severe pollution problems. Often these areas are associated with densely populated settlements, and the communities of these settlements are affected by pollution from these activities. However, other source-directed strategies will address these activities. More importantly, these activities generate an income, as part of the polluting process, and must therefore be addressed differently.

2.5 Who will implement the Strategy?

A number of government agencies outside of DWAF are responsible for the planning, financing, development, servicing and upgrading of settlements, and may be in a better position to drive the implementation of the Strategy. However, DWAF-Water Quality Management has the mandate and accountability to protect the country's water resources. These other agencies are primarily concerned with the provision of housing and services, and while they recognise the need to protect the water environment, implementation of the Strategy is unlikely to receive priority attention. Making these agencies responsible for the implementation of the strategy also creates a "Gamekeeper-Poacher" conflict that is likely to see the strategy fail on a national basis. The Water Quality Management function of the Department must, consequently, remain the driving force behind the Strategy.

The financial status of many local authorities is also likely to preclude traditional command and control mechanisms to address the problem. It is, therefore, important that DWAF aims for a consensus position with respect to those practices and services required to manage the water quality impacts of settlements. Similarly, DWAF does not have a direct mandate to control housing and services. DWAF water quality management staff should, therefore, focus on influencing outside agencies such that development occurs in a manner which ensures protection of nearby water resources.

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The Water Quality Management function of DWAF must remain the primary driving force behind the Strategy, but this must be achieved by co-operative governance with agencies responsible for the planning, development and servicing of settlements.

2.6 The Constitutional and legal basis for the Strategy

The Constitution makes provision for the management of water resources at a national level. This includes both provision of sufficient water, and protection of the resource for future generations. More importantly, Section 24 of the Bill of Rights requires government to ensure an environment that is not harmful to the health and well-being of all South Africans, through "all reasonable legislative and other means". Given the severe impacts of pollution from dense settlements, these provisions support the implementation of this Strategy.

However, while protection of the water resource is a national responsibility, the Constitution indicates that local government has legislative and executive authority over *inter alia*; water

and sanitation services, domestic waste water and sewage disposal, pollution, cleaning, stormwater management, refuse removal and solid waste disposal. In addition, Provincial government has the exclusive competence for provincial planning (including the siting of settlements), while environmental protection is seen as a concurrent provincial and national competence.

The activities of provincial and local government, therefore, largely determine the impacts settlements have on the water resource. Legislation aimed at Provincial and Local government planning already includes measures to ensure protection of the environment. Control over pollution from dense settlements can, therefore, be construed as primarily a Local and Provincial government responsibility. But, a number of provisions of the Constitution allow for national policy to override local and provincial competencies. In this respect national legislation can set norms and standards to protect the environment and can establish minimum standards for service delivery. As such, the Constitution does not prevent DWAF from specifying a national approach to manage the water quality effects of settlements. However, the national approach should be implemented at a local level.

However, there is still considerable confusion in environmental legislation in South Africa, and the lines of authority, particularly with respect to the environmental impacts of settlements, are not always clear. More importantly, the Constitutional requirement for co-operative governance, and the need to avoid legal action against other spheres of government, demands that DWAF develops this strategy, as well as recommendations for any particular settlement, in co-operation with other agencies in all three spheres of government.

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The Constitution does not prevent the development of this Strategy, but requires that DWAF makes special provision for co-operative governance in the development and implementation of the Strategy.

2.7 Principles to guide implementation of the Strategy

The planning, development and servicing of settlements is one of the primary focus areas of the South African Government, and the rapid provision of services is a significant priority of all government agencies. Implementation of the Strategy must be sensitive to these political and moral responsibilities. Moreover, the Strategy will only be successful if it has the support of the affected communities, and is compatible with other government initiatives. The following principles, therefore, underlie the Strategy.

- *Implementation of the Strategy should include negotiation with other government bodies, at all three spheres of government, and with the affected communities.*
- *Recommendations for any settlement must be compatible with, and should complement national policies that address poverty, service delivery, and environmental protection both within the Department of Water Affairs and Forestry, and in other Departments.*
- *Implementation of the Strategy should not slow or prevent service delivery under other national, provincial or local government programmes.*
- *DWAF should participate in education campaigns that raise community awareness of the dangers of poor water quality and pollution.*
- *Water quality management in this sector should take cognisance of, and in some cases explicitly address, the inequities of the past.*
- *Recommendations should address all components that contribute to the water quality problem, be these socio-economic, physical or behavioural.*
- *Water quality management actions should not only aim to provide engineering and other services, but should include capacity building and education with respect to the services provided.*

- *Implementation of the Strategy should encourage ownership of, and payment for, services which contribute to a better standard of living, consistent with the principles of the Masakhane campaign.*
- *Recommendations should recognise that authorities in all spheres of government are severely restricted by a lack of human and financial resources, and as such should include mechanisms to ensure its financial viability and sustainability.*
- *Implementation should recognise that significant resources must be spent in promoting capacity building and education in the affected communities, and the important role which can be played by women in the implementation of the Strategy.*

2.8 Summary

- 1) DWAF, and in particular those directorates involved in water quality management, have both a responsibility and accountability to protect this country's water resources from the impacts associated with settlements.
- 2) Pollution from inadequately serviced settlements is known to result in significant water quality problems, and to impact on the health of the community. DWAF must, therefore, develop strategies and management practices to deal with this problem.
- 3) The National Water Act places particular emphasis on protection of the water environment, and makes provision for both resource- and source-directed strategies. This Strategy is a source-directed approach, but is guided by the resource-directed strategies.
- 4) This Strategy aims to ensure that services and management practices which address waste in the settlement strike the appropriate balance between the size and density of the settlement, the class of the receiving environment and the financial and institutional sustainability of these services.
- 5) There is a political and moral responsibility on all Government departments to facilitate the provision of housing and services. As such, DWAF-WQM can not implement the Strategy without recognising the needs of the affected communities.
- 6) Legislation, including the Constitution, is not clear-cut with respect to the responsibilities for managing the water quality effects of dense settlements. It is, therefore, important that the Strategy place particular emphasis on co-operative governance procedures.

3 ADDRESSING POLLUTION FROM SETTLEMENTS

Chapter 3

This chapter outlines the overall approach to managing pollution from settlements. This is done by: -

- Outlining the causes of water quality problems associated with settlements.
- Outlining how appropriate levels of services support waste prevention and waste minimisation policies.
- Outlining the problems and constraints with respect to the provision of these services.

3.1 Introduction

The previous chapter indicated that managing the water quality impacts of settlements rests on balancing the need to protect the water resource with the need to develop and service settlements in a financially and institutionally sustainable way. However, most local authorities see poorly serviced settlements as a drain on their resources. People in the more densely populated settlements are often poor, and are not able to pay for high levels of services. There are, nevertheless, strong community and political pressures to provide higher levels of services. Pollution control practices which are seen to slow, or divert attention from this need, or which place extra financial burdens on the already cash strapped local authorities, are unlikely to succeed.

As such, the success of the Strategy lies in reconciling the goals with respect to managing pollution from settlements, with the political and economic realities of the South African situation. This can only be done by fostering a sound understanding of the causes of pollution in settlements, and of the financial and resource constraints in this sector. This chapter is aimed at these issues.

3.2 The causes of pollution from dense settlements

3.2.1 Water quality problems in dense settlements

A number of water quality problems are associated with dense settlements. The most important of these are: -

- *Microbiological contamination* by faecal pathogens, which has severe health implications for water users and the community. These mostly come from human excreta, and dirty washing water (grey water). However, high concentrations of faecal bacteria may be found in stormwater runoff, and in livestock faeces.
- *Nutrients*, mainly phosphorus and nitrogen, which cause eutrophication and increase the costs of treating water to potable standards. These mostly come from human excreta and grey water, but may also be present in high concentrations in the stormwater runoff.
- *Solid waste (litter)* from public spaces and from household refuse, which causes ecological, aesthetic and health problems, and affects the functioning of stormwater and sewage services.
- *Sediment* from unpaved areas in the settlement, which accumulates in rivers and dams, affects aquatic habitats, and reduces storage of stormwater run-off.
- *Habitat destruction* mostly by building in the riparian zone which affects the natural functioning of river ecosystems, and allows waste to get into the rivers.

(Other wastes, like oxygen demanding substances, metals, hazardous wastes and salts may also be associated with settlements, but are considered less important in the South African context.)

3.2.2 Four waste streams

These wastes are associated with four waste streams: -

- sewage waste (human faecal matter),
- grey (or sullage) water,
- stormwater and runoff from the settlement, and
- solid wastes (mostly household refuse and litter).

These waste streams interact, e.g. faecal matter from blocked sewers or litter may be washed into the water resource by stormwater runoff, while solid wastes may block sewer systems. Management of the water quality impacts of dense settlements must, therefore, be aimed at all of these waste streams.

3.2.3 Physical, Institutional and Social causes

Water quality problems result from the *physical* breakdown or inadequacy of one or more of the waste streams (Figure 3.1), and are mostly associated with inadequate, or poorly functioning, services. These *physical* causes of water quality problems include inappropriate sanitation for the density of the settlement, no facilities to dispose of grey water, sewer blockages due to inappropriate design, and poor design of solid waste removal services. Encroachment onto, and destruction of the riparian zone, also impacts on the water environment can be considered as a physical problem.

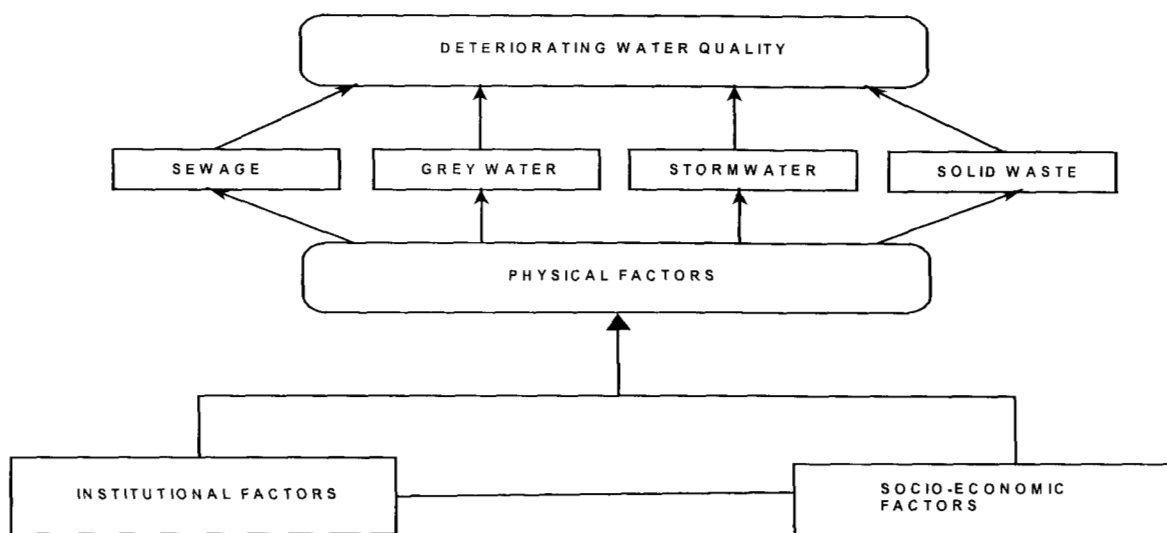


Figure 3.1 The causes of pollution from dense settlements, showing the interaction between the physical, institutional and social factors. (see Appendix A)

However, these *physical* causes of pollution are situated within the *social* and *institutional* environment within the settlement. These exacerbate or directly cause the physical problems (Figure 3.1). Important *institutional* concerns are a lack of funds within the Local Authority to address the problems, a lack of capacity to maintain the services, and the diversion of resources to other priorities. *Social* issues include non-payment or illegal use of services, vandalism and a lack of awareness with respect to the proper use of the services.

Pollution in settlements must be managed by addressing all three of these components. This requires addressing the *physical* factors which contribute to the problem, usually by direct intervention within one of the four waste streams, as well as the underlying *institutional* and *social* issues, usually by softer intervention options like capacity building and education. The Problem Trees outlined in Appendix A provide a basis for identifying the underlying causes of the water quality problems, and form the “structured” part of the “structured-facilitated” process described in the next chapter. The example below illustrates how these issues all contribute to the pollution problem.

Example - The problem of littering

Littering occurs when people throw solid waste directly into the streets. This is a *Social* problem, and is addressed by awareness campaigns.

However, if there are no bins provided, people can't be expected to throw litter away safely. This is a *Physical* problem, and can be addressed by providing bins or skips.

But, if these bins are not regularly collected and emptied, litter will still overflow into the streets, and people will no longer use the bins. This is an *Institutional* problem, which must be addressed by capacity building in the Local Authority.

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The water quality effects of settlements must be managed by addressing the physical problems associated with the four waste streams, but the sustainability of these *physical* interventions rests on addressing the *institutional*, and *social* factors contributing to the problem.

3.2.4 The Production, Delivery, Transport and Use continuum

Pollution from dense settlements, and its effects on water users, can be divided into four processes. These elements represent a conceptual continuum, which describes the pathway pollutants may follow from the point at which they are generated to the point at which they impact on the use of the water. These elements, and the focusing of management strategies on these elements, are consistent with DWAF's water quality management/hierarchy (section 2.2) and provide a basis for understanding the problem of pollution from dense settlements. These are:-

- **Production** refers to the generation of waste within the settlement. This includes waste generated as human excreta, as solid waste (litter), as sullage or grey water, as livestock wastes, from cultivated areas, from vehicles and from atmospheric deposition. Minimising the production of waste equates to a philosophy of *waste prevention*.
- **Delivery** refers to the movement of these wastes into the surface or groundwater environment. This occurs from the breakdown of the sewerage system, stormwater runoff, direct disposal to the rivers, or as seepage into the groundwater. Minimising the amount of waste left behind in the settlement (i.e. that which can be delivered to the water environment) ensures *waste minimisation*, and usually relates to the level and operation of services. Similarly, management practices aimed at trapping this waste before it is delivered to the water environment ensure *impact minimisation*.
- **Transport** refers to the movement of waste once it has reached the water environment, as well as the chemical, physical and biological transformations that may occur in this process. Transport occurs through either the surface or groundwater component.
- **Use** refers to the action of using the water. This also provides opportunities for management, for example by treating the water before use, or by warning communities not to use, or swim in, rivers and dams. (Figure 3.2)

While the problem of water quality can be addressed at any point in this continuum, this Strategy focuses on management of waste before it reaches the water environment i.e. on the *Production and Delivery* elements. However, in emergency situations, like cholera outbreaks, management of the Transport and Use components should be considered.

Figure 3.2 The production, delivery, transport and use continuum, depicted on a catchment basis

3.2.5 Waste production in Settlements

The amount of waste produced in any settlement is primarily associated with its size and density. The larger the settlement, the more waste is produced. The more densely populated the settlement, the more waste which is produced in a smaller area. In very dense settlements, lack of space also forces people onto the riparian zone, which contributes to the settlement's impact on the water resource.

However, a number of other issues influence the amount of waste *produced*. The socio-economic status of the settlement determines the amount of waste produced per household. Poorer communities produce less waste per household, while settlements provided with in-house water supplies tend to produce more grey water, or wastewater (i.e. when communities are supplied with a fully reticulated sewerage system). Waste production from agricultural activities, like livestock or small agricultural fields can also be a problem in rural communities.

Effective planning, servicing, and siting of settlements can pro-actively manage the amount of waste produced by settlements. This involves selecting appropriate housing densities and services for the receiving water environment class, or the siting of settlements that may result in water quality problems away from sensitive water resources. Where settlements are planned along river courses, planning to ensure protection of the riparian zone can also be construed as *waste prevention* (although destruction of habitat does not produce waste *per se*). This may include siting sports fields or other recreational facilities along rivers to prevent encroachment into the riparian zone.

However, waste *production* can also be managed reactively by focusing on the social factors which promote waste production, for example by encouraging behaviour like recycling and fertiliser production from composting toilets. Water saving schemes which reduce the volume of sullage water are also particularly suited to settlements with a higher water use, and may reduce the load on the waste water treatment plant. Similarly, regulating livestock numbers can contribute to minimising the amount of waste produced. It is, however, inappropriate to restrict socio-economic development in order to effect *waste prevention*.

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DWAF can effect waste prevention by intervening in the planning of dense settlements by participation in the Integrated Development Planning (IDP) or land restitution process, and in the formulation of Land Development Objectives (LDO). Waste prevention can also be promoted by active participation in water conservation campaigns and by encouraging recycling.

However

3.2.6 Waste delivery in settlements

The amount of waste *delivered* to the water environment is primarily associated with inadequate or poorly functioning services. The levels and operation of services in the settlement determine how much waste is left behind in the settlement. Waste that is left behind in the settlement can potentially be delivered to the water resource. For example, pit latrines leave the sewage waste in the settlement, and nitrate may seep into the groundwater. Similarly skip systems for household refuse often overflow and leave solid waste behind in the settlement, which can be carried into the water environment by stormwater or wind.

In sparse settlements natural assimilation of waste in the delivery pathway, means that little waste will actually reach the water resource. But, as settlement densities increase, the amount of waste produced increases, and fewer open spaces provide less opportunity for the natural assimilation of the waste during delivery. Well operated services which ensure safe disposal of the waste are, therefore, more important as settlement densities increase. Reducing the amount of waste that can be delivered to the water resource by ensuring services that are appropriate for the size and density of the settlement promotes *waste minimisation* in settlements. Similarly, management practices that trap and remove waste in the delivery pathway, for

example litter traps or stormwater detention ponds, also ensure delivery management.

Waste minimisation in settlements may also be pro-active by intervention in the planning of services for settlements, or may be reactive by upgrading services in settlements with inadequate services, or by ensuring the appropriate use and maintenance of the services. Inappropriate use or maintenance of services has been identified as one of the most serious issues associated with the more dense urban and peri-urban settlements in South Africa. Higher levels of service must, therefore, be associated with better maintenance of the services. This requires capacity building and training with respect to these services, and advocates the use of low maintenance, intermediate levels of service where ever possible.

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Waste minimisation is effected by promoting services that either minimise the amount of waste that is left behind in the settlement, or which isolate the waste from the water environment. Similarly, trap and treat options to remove waste in the delivery pathway address *impact minimisation*.

3.2.7 The pollution cycle

Much of the problem of pollution of dense settlements occurs when the levels and operation of services are inappropriate for the amount of waste produced in the settlement. The amount of waste produced in settlements is, in most cases, associated with the density of the settlement. These settlements usually house the poorer communities. Service providers are often hesitant to supply these poor communities with high levels of service, as they are unlikely to be able to pay for these services. Where high levels of service have been supplied, a lack of funds to maintain these services often leads to the breakdown of these services. This is exacerbated by a lack of understanding within poorer communities of the operation of the services, a culture of non-payment, or even the deliberate vandalism of the services.

In these communities a polluted environment demoralises the community and encourages further pollution, or limits the effectiveness of those services which are provided, e.g. where litter blocks stormwater systems, or where overflowing skips prevent people from safely disposing of household refuse. Where large amounts of waste are left in the settlement, the community is less likely to take care when disposing of waste, to pay for services, and to report breakdowns in service provision. This leads to further pollution, eventually leading to serious health effects for the community. This forms a pollution cycle, which tends to exacerbate the problems over time (Figure 3.3).

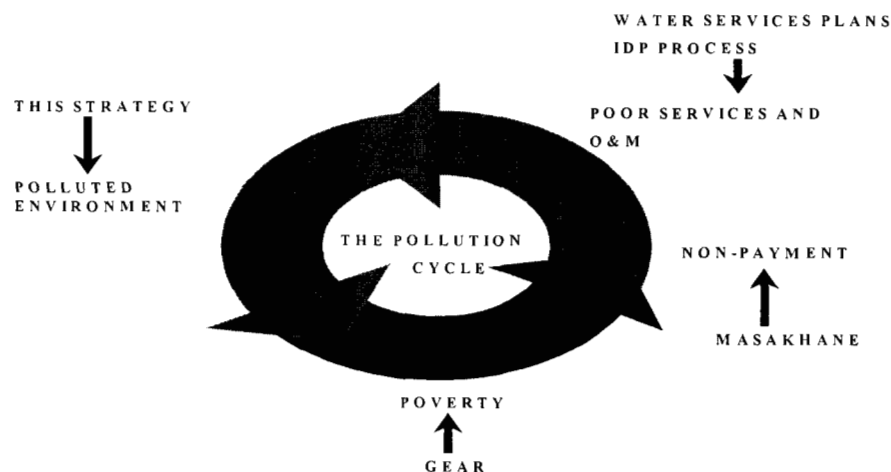


Figure 3.3 The pollution cycle in settlements.

The key to the sustainable management of pollution from settlements lies in breaking this

pollution cycle. This requires both services to manage the waste, and capacity building within the service providers and community in order to build an awareness of the need to maintain these services. Education of the community with respect to the need to pay (or at least part pay) for these services is also critical. However, it is unreasonable to expect people to pay for higher levels of services if litter is lying knee deep in the streets and *vice versa*. This requires better relationships between service providers and consumers where consumers demand effective services in return for payment.

3.3 Balancing services and affordability

Government agencies in all three spheres of government have been actively developing policies, strategies and minimum standards with respect to the delivery of services, housing, land tenure and land restoration. These strategies have all been constrained by economic realities, and by the lack of resources to implement even the best intentions of these agencies. Minimum standards have been set at levels that are considered to provide the basic levels of service to alleviate the plight of disadvantaged communities, but which are also considered to be affordable to the community. The services recommended generally have the advantage of low maintenance costs, and are hence more affordable to the community. High levels of service, which are not affordable to the community are, therefore, considered to be unsustainable, and are often discouraged. The Government has, therefore, decided on RDP levels of service, which consist *inter alia* of a Ventilated Improved Pit Latrine, and 25L of water per person per day within 200m of the home, as the basis for sanitation and water supply. Similarly, NaSCO has made a strong case for VIPs as a basis for sanitation services in their Peri-urban Sanitation Policy.

In many cases the advantages of supplying these services, where no services previously existed, are seen to far outweigh the possible environmental consequences of these services. Many service providers also argue that these services will realise an environmental benefit where they replace bush and spade toileting⁴ or bucket toilet systems. Service providers are therefore often loath to provide better than this basic RDP level of services. Similarly, the urgent need for land and housing is seen to outweigh the dis-benefits of development, even near sensitive environments. While all these agencies have included the need for environmentally sustainable services in their policies, insistence on higher levels of service, or the prohibition of development purely for environmental benefit, is likely to meet resistance in many cases. More importantly, providing higher levels of service, which are unlikely to be maintained, may create even more serious pollution problems. It is, therefore, important to carefully weigh the need for services with high operation and maintenance costs with the threat to the water resource.

The amount of waste that is produced in the most densely populated settlements usually requires the highest levels of services, and the greatest attention to the operation and maintenance of these services. However, the extent of poverty in South Africa means that very few, if any, Local Authorities will be able to afford to maintain high levels of services in all their settlements (see Chapter 6). This demands that in most cases implementation of the Strategy should focus on identifying options with lower operation and maintenance costs.

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Implementation of the Strategy must carefully balance the need for higher levels of services with recognised threats to the water environment. In any event, the Strategy should focus on services with low operating and maintenance costs.

⁴ Bush and spade toileting refers to situations where the community is forced to use open areas, often in watercourses, for toilet facilities.

3.4 Community and women's involvement.

Even the best intentions, both on behalf of the community and of the Local Authority, to address pollution can not be realised without providing some services to safely dispose of waste. However, communities often demand the highest levels of services, which may be exacerbated by political promises for better services. This often leads to services which are unsustainable, and which eventually result in more serious water quality problems. In most cases this will require negotiation to establish intermediate levels of service that satisfy the desire for better services, which are both financially and environmentally sustainable, and which satisfy the demands of the community. Similarly, building a better community – service provider relationships can lead to better maintenance and payment for the services once they are in place.

This means that active participation by the community in addressing pollution from settlements is critical. In addition, much of the problem can be addressed by changes in community behaviour. These “softer” issues are addressed by building an awareness of the importance of a healthy environment and of the factors that contribute to pollution. Fortunately, communities in South Africa are already demanding a greater say in their governance, and have been actively participating in local decision making. This means that in most cases the communication structures and processes have already been established.

International experience has also shown that active participation by women in the decision making process is critical. In most cases women are most actively involved in the use of the services, and via their children are usually directly affected by poor community health. It is, therefore, important to identify the role women may play in the use of the services, and to directly address their needs.

3.5 Capacity Building and co-ordination

Clearly, much of the success of the Strategy lies in how effectively DWAF interacts with Local Authorities and the community. Similarly, implementation of the recommendations of the Strategy will largely lie within the ambit of the Local Authority and community. However, the backlog in services has left most Local Authorities and communities with a lack of capacity to deal with the requirements of the Strategy. Institutional capacity building, particularly within the Local Authority and at grass roots level is consequently critical.

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Much of the problem of pollution in settlements can be addressed by behavioural changes, which have little or no financial implications. Community participation is therefore critical to the implementation process.

3.6 Summary

1. Management of pollution from dense settlements must be focused on these waste streams, and it is important to address all of these waste streams in any settlement.
2. Within these waste streams, the water quality impacts of settlements are a function of Physical, Institutional and Social factors. All of these factors must be addressed to ensure the sustainability of pollution management options.
3. The process of pollution from settlements can be divided into a conceptual continuum of waste *Production, Delivery, Transport and Use*. Implementation of the Strategy should concentrate on waste *Production and Delivery*, but *Transport and Use* management can be considered in emergency situations.
4. Implementation of the Strategy should focus on breaking the pollution cycle.
5. Community participation, and in particular of women in the community is critical to successful identification of appropriate interventions.

4 DETERMINING APPROPRIATE INTERVENTIONS

Chapter 4

This chapter outlines the approach to identifying appropriate management practices and services for any given settlement. This is done by :-

- Outlining an approach for prioritising settlements for management attention.
- Outlining how a “structured-facilitated” process based on identifying the physical, environmental, institutional and social problems in each waste stream can be used to identify appropriate interventions.

4.1 Introduction

The previous chapters have shown that the approach to managing the water quality effects of settlements will be based on identifying the appropriate balance between:-

- 1) the amount of waste produced in the settlement (size and density),
- 2) the level and operation of services (and management practices), and
- 3) the sensitivity of the receiving environment (Resource Class).
- 4) The financial and institutional resources available.

It was also shown that pollution from densely populated settlements results from physical, institutional and social problems in four waste streams. Interventions that aim to find this balance must be based on these problems. However, these problems vary widely between settlements, and it is difficult to outline generic interventions that will be appropriate for all settlements. Appropriate interventions must, therefore, be based on a site-specific problem definition in the settlement.

There are four main components of this problem definition:

- prioritisation of settlements and waste streams for management attention.
- Identification of the stakeholders to participate in the process,
- The problem definition using a structured-facilitated process, and
- Identification of an appropriate suite of interventions to address the problems.

This chapter addresses this process.

Note: This chapter only outlines the approach to identifying appropriate interventions, and does not give details of the process. The reader is referred to:
Volume 2: Guidelines for Implementation and;
Volume 3: A guide to problem analysis.

4.2 Prioritising Settlements

All settlements have some impact on the receiving water resource. However, the limited resources to address the problem demand that attention is focussed on those settlements that pose the greatest threat to the water environment. The National Water Act also requires that the particular needs of the receiving water resource, in terms of its Resource Class (see Chapter 2), must also influence the priority given different settlements. This priority must, therefore, not only be determined by the water quality problems in nearby water resources, but also by the characteristics of the settlement (or proposed settlement). As such prioritisation contributes to finding the appropriate balance between the sensitivity of the water resource, the size and density of the settlement, and the level and operation of the

services in each waste stream. The following issues must be considered in this prioritisation process:-

- *Do water quality problems occur?*
This focuses on whether the Resource Quality Objectives (RQOs) are being met. Priority should be given to settlements where the RQOs are being (or are likely to be) exceeded. This step focuses attention on settlements near sensitive water resources, and ensures the right balance between protection of the water environment and development. Prioritisation of water quality problems should also be based on the severity and importance of the resulting health and ecological effects, both for local communities and the region as a whole. The nature of the water quality problem may also indicate which waste streams contribute most to the observed problems.
- *Are the municipal services adequate?*
This includes an assessment of both the levels, operation and maintenance of the services provided in each waste stream. Large densely populated settlements with poor or no services must receive priority attention. This is more important in urban and peri-urban settlements where failing services create the most severe problems. This prioritisation process can be pro-active with respect to planned services for settlements, and helps balance services with size and density.
- *What are the impacts of the settlement environment?*
This identifies whether the environment around the settlement will exacerbate water quality problems. Characteristics like slopes, soils, and amount of hard surfaces determine its overall impact on the water resource and should be considered in this process. This prioritisation step can be pro-active, e.g. settlements planned on steep slopes and sandy soils, particularly near sensitive water resources should receive more attention.
- *What are the implications of the management environment?*
The institutional and social conditions in a settlement indicate whether existing (or proposed) services in each waste stream are likely to be effective. Poor consumer / service provider relationships lead to non-payment, which exacerbates the problems. Local Authorities with greater institutional capacity are also more likely to be able to successfully implement the recommendations of the Strategy. This therefore attempts to balance financial and institutional sustainability with pollution from the settlement.
- *Other issues*
A number of other issues may affect the priority given to the settlement or waste streams. In many cases the community may be demanding better services, or there may be political pressure to provide better services. Similarly, the stakeholders' previous experience can influence the outcome of the project. These issues affect the amount of resources and support the process would receive, and consequently play a significant role in prioritisation.

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The prioritisation of settlements and waste streams must be based on both the impacts on the water resource and the characteristics of the settlement. This allows both pro-active prioritisation of settlements within the planning process, and reactive prioritisation of existing settlements, and contributes to finding the appropriate balance between development and protection.

4.3 Identifying and involving stakeholders

Settlements differ considerably in their physical, social and institutional characteristics. This means that the problem-identification process must be site-specific. More importantly, many of the processes which lead to pollution can only be identified by stakeholders involved in

the day-to-day livelihood of the settlement. This requires active participation by all the stakeholders within that community, as well as some downstream stakeholders who may be affected by pollution from the settlement. The Structured-Facilitated methodology is consequently a site-specific and participative process that requires input from all the stakeholders, and its success is largely determined by stakeholder participation.

The physical, institutional and social problems in each waste stream also provide the “structure” to identify the stakeholders who need to be involved in the problem identification. Stakeholders include service providers and consumers in each waste stream, as well as DWAF staff who may be able to identify the nature of the water quality problem. More specifically, stakeholders who may be able to identify physical (e.g. municipal engineers, health officers etc.), social (community leaders, & people who use the services), and institutional (Local Authority staff, rates collectors etc.) problems in each waste stream must be involved in the process. Stakeholder participation should, nevertheless, remain flexible and should adapt to the specific problems identified. As such, the stakeholders contributing to the process may change during implementation.

4.4 Identifying interventions via a Structured-Facilitated process

4.4.1 Introduction

Each settlement is characterised by a unique set of problems. Interventions must also be aimed at the settlement specific “root” causes of pollution in order for them to be successful. The approach to identifying interventions must, therefore, focus on the development of a settlement specific problem analysis, based on the generic example presented in Appendix A.

4.4.2 The Structured-Facilitated process

Previous attempts to manage pollution from densely populated settlements have failed in the longer term because they do not address all the factors contributing to the problem, or have missed the root causes of the problem. The “structured-facilitated” process aims to overcome this by formulating settlement specific problem trees within the “structure” provided by the four waste streams, and the physical, social and institutional issues as discussed in Chapter 3. This process also aims to “facilitate” dialogue between DWAF, the community Local Authority and service providers to jointly identify the problems and solutions. This is done by investigating the pollution problem in increasing depth until consensus and agreement can be reached on the root cause(s) of the problem (see example below). This process is illustrated in more detail in Volume 3 of this series – A Guide to Problem Analysis.

4.4.3 The advantages of the process

The structured-facilitated process offers several advantages, which should be exploited to maximise the benefits of the process.

- It helps to ensure that all the stakeholders are involved in, and contribute to the identification of problems and solutions.
- It helps to ensure that all the problems contributing to pollution (including the underlying issues) are identified by encouraging stakeholders to address all the waste streams, and the physical, social and institutional causes of problems.
- It helps to build a common understanding of the constraints facing each of the stakeholders, and how co-operation could benefit all involved.
- It is based on clearly defined process or pathway. Newcomers to the process can be rapidly brought up to speed with past progress.
- The more defined path means that discussions can be focused on the important issues, and is less easy to side track. This can speed up the process.
- The process helps to build an understanding of the processes that cause pollution, and hence contributes to capacity building.
- The process is relatively easy to understand, and therefore allows the community to

contribute meaningfully to the process.

- Joint identification of the problems helps build better community/service provider relationships.

IDENTIFYING POLLUTION PROBLEMS IN THE SEWAGE WASTE STREAM

Problem statement

Sewer blockages are common, and are not timeously rectified. Large volumes of raw sewage, therefore, flow untreated into nearby streams. Children may also play in the area, thereby increasing the health risks, and downstream water users are at a considerable risk.

Using the structured-facilitated process

This problem lies in the sewage, and sullage waste streams, but may include elements of the solid waste, waste stream. - The service provider responsible for operating and maintaining the sewer and solid waste systems, the community, DWAF, and the Department of Health should be involved in identifying solutions.

- 1) At first this may seem that the service provider is not effectively operating and maintaining the sewer system. (i.e an institutional problem).
- 2) However, when questioned, the service provider may indicate that there are insufficient funds (due to non-payment) to address the problem, and because many of the blockages appear to be deliberate, they do not prioritise the clearing process. (i.e a social problem).
- 3) However, when questioned as to why the community blocks the sewers and does not pay for services, it may emerge that there is a poor consumer – service provider relationship. This may be compounded by a general lack of awareness as to the dangers of the problem and by poverty. A poor solid waste collection system, and hence solid waste which is thrown or is washed into the sewer system may contribute to this problem.
- 4) Further resolution of the problem may indicate a range of factors that contribute to blockages, for example stolen manhole covers, the use of newspaper for anal cleaning, overloaded sewers and deliberate blocking to use effluent for irrigation (i.e. a physical problem).
- 5) Most importantly, the problem has elements of physical, social and institutional issues, all of which should be identified and addressed by appropriate interventions.

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The structured-facilitated process provides a method to rapidly identify all the factors that contribute to the pollution problem. This process allows for the joint development of a settlement specific problem analysis, which forms the basis of identifying appropriate interventions.

4.5 Choosing appropriate interventions

The settlement-specific problem analysis produces a list of physical, social and institutional problems in each waste stream. Interventions must be aimed at each of these problems. However, the selection of the right intervention for each problem will largely determine the success of pollution abatement in the settlement. The following points should, therefore, guide the selection of the interventions.

- Interventions should recognise the Production, Delivery Transport and Use continuum (see section 3.2.2) and the pollution management hierarchy (see section 2.2.)
 - This means that interventions which limit the production of waste (waste prevention)

should be considered first. This may include interventions like recycling, water saving (i.e grey water reduction), preventing encroachment onto the riparian zone, and planning settlement densities. Secondly, interventions aimed at minimising the amount of waste that can reach the water environment should be considered. This entails ensuring that the services are appropriate for the density of the settlement, and are appropriately used and maintained. This may also include interventions that trap and remove the waste in the delivery process, for example litter traps and artificial wetlands. Lastly, interventions, which maximise the assimilation of wastes within the water resource, and those aimed at the Use component should be considered.

- Interventions aimed at capacity building and behaviour changes should be considered.
 - Significant improvements to water quality can be realised by ensuring that the services that are in place are appropriately used, and that the community is aware of the dangers of pollution. Similarly, building a better consumer – service provider relationship can reduce potential pollution problems. These interventions do not require major construction and are hence often cheaper and more rapidly implemented.
- Lower cost – low technology interventions should be considered
 - Many of the problems in the “better serviced” urban and peri-urban settlements arise due to failing waste collection systems and there is a direct link between the technology used (and hence the O&M costs) and the failure of these systems. This means that low cost, and appropriate technology solutions should be investigated as a first option.
- Win-win solutions should be addressed.
 - Interventions that realise benefits for the community are more likely to gain support, and be implemented. These may include interventions that create employment opportunities, or realise economic benefits (like recycling). Similarly community based initiatives are more likely to succeed and be sustainable.
- Innovative site-specific solutions to the problem should be encouraged.
 - Pollution problems in dense settlements arise due to the complex interaction of a number of factors. These problems are consequently often unique to the settlement, and may require a unique approach to the problem.

Certain interventions may create problems in themselves, for example replacement of skip systems with plastic bins may create opportunities for vandalism. It is therefore important to also identify future problems that may result from the interventions chosen. In addition, it is critical to identify sources of both capital funding and operating and maintenance costs of any interventions chosen. This means that the selection of the suite of interventions is an iterative process, which aims at identifying a suite of interventions that are focused on the settlement’s specific problems, and which are financially viable and sustainable.

The implementation of this suite of interventions should be co-ordinated into an "Intervention Plan", which addresses the timing of the implementation process, the financing of interventions, responsibilities for the interventions, and the monitoring of the implementation process.

Volume 2 of this series – Guidelines for Implementation provides an extensive list of interventions that may be considered in any settlement and additional advice on the selection of interventions and on the preparation of an Intervention Plan.

4.6 Steps in the structured-facilitated process

The structured-facilitated process is designed to identify an appropriate suite of interventions for any settlement. It is a site-specific process that follows the process below.

- 1) Prioritise the settlements in the region, and in each settlement, then identify the priority waste streams.

- 2) Identify the stakeholders who can contribute to identifying problems and interventions in each waste stream.
- 3) Jointly characterise the settlement to identify physical, social and institutional problems in each waste stream.
- 4) Identify and list possible interventions that address the problems in each waste stream.
- 5) Select a suite of interventions best suited to the settlement's characteristics
- 6) Develop an Intervention Plan that identifies a time frame and responsibilities for implementation.
- 7) Identify means to fund the capital as well as the operation and maintenance costs of the interventions.
- 8) If necessary modify the Intervention Plan to ensure that the interventions are financially viable and sustainable.

This process is illustrated in the road map on the following page, and this road map forms the basis for discussions in Volume 3 – A guide to problem analysis, and Volume 2 – Guidelines for Implementation. These documents provide additional details on steps 1 to 3, and on steps 4 to 7 respectively.

4.7 Conclusions

1. It is important to identify the root causes of pollution from settlements. These are in turn associated with the physical, institutional and social problems in each waste stream.
2. These problems are identified using a structured-facilitated process, which identifies the settlement specific causes of pollution in each case, and identifies an appropriate suite of interventions to address these.
3. This process must be guided by the principles laid out above.
4. The suite of interventions chosen must be suited to the particular settlement's needs, and must be financially viable and sustainable.

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5 INFLUENCING THE PLANNING OF SETTLEMENTS

Chapter 5

This chapter outlines how DWAF-Water Quality Management may influence the processes of planning, development and upgrading of settlements in order to proactively give effect to the Strategy.

5.1 Introduction

The structured-facilitated process described in the previous chapter is primarily based on facilitating dialogue between DWAF, the Local Authority and the community. While this process can be used to identify problems in settlements still in the planning stage, proactive implementation of the strategy must include other stakeholders and processes. Similarly, once the structured-facilitated process has identified interventions, the process of implementation may have to follow additional steps. The process of proactively implementing the Strategy in settlements in the planning phase, as well as the steps which may be required during implementation are described in this chapter.

The process of influencing settlement planning has two components *viz.* identifying;

- How to intervene in the planning, development and upgrading of settlements?
- Who and what to influence?

These components are outlined in more detail below.

5.2 How to intervene in the planning, development and upgrading of settlements

Proactive management of pollution from dense settlements is confused by DWAF's constitutional mandate. Most of the activities related to the planning of settlements have been delegated to Provincial and Local Government. This is also consistent with the provisions of the Water Services Act which intends to devolve decisions on water related services to the lowest possible level.

However, it is clear that appropriate planning of settlements in terms of their positioning relative to sensitive water resources, their size and density, and the services planned, can have a significant impact on the eventual water quality impacts. Influencing settlement planning is also aimed at the production element in the pollution process, and should therefore be attempted as a first option. DWAF-Water Quality should therefore intervene in the planning, development and servicing of settlements in the following ways: -

Influence:

This entails building a common understanding with other stakeholders with respect to the need to manage the water quality effects of settlements, and the requirements of the Strategy. Influence may require interaction with any of the Stakeholders (including DWAF's Water Services Branch), and is aimed at getting these stakeholders to willingly implement the interventions identified. It will generally be the first step in giving effect to the Strategy.

Co-operative Governance:

This entails the formulation of joint committees, which have executive and decision making powers, with other government agencies. Co-operative governance generally follows influencing, and is aimed at a negotiation and consensus approach towards the identifying and implementing appropriate interventions.

Regulations:

This is the final step in the implementation of the interventions. It focuses on the development of regulations that place a legal obligation on agencies to implement the interventions. These regulations may be written as municipal bylaws, or as regulations under national legislation. This step must come after co-operative governance and serves as the ultimate output of co-operative governance schemes.

Direct intervention:

Direct intervention refers to actions undertaken by DWAF itself. This can occur when DWAF: Water Services undertakes water supply or sanitation schemes. Or, in special cases when the water quality impacts are severe and local capacity doesn't exist, where DWAF-WQM undertakes the pollution control activities. However, this should only be investigated in extreme cases where urgent action is required to protect community health. In these cases DWAF may recover the costs of interventions from the responsible authority. Direct intervention should only be considered after other forms of intervention have been exhausted.

5.3 Who and what to influence?

5.3.1 Intervening in the Planning and Development of settlements.

Pro-active intervention in settlement planning and development is the most effective way to ensure implementation of pollution management interventions. Influence over, and potentially co-operative governance within the planning processes should, therefore, form a major focus of implementing the Strategy.

Policies and legislation within the Departments of Land Affairs, Housing, and Constitutional Development primarily dictate settlement planning. These policies are largely given effect by Provincial Departments of Housing and Land Affairs, and by Local Government and take place within the Integrated Development Plan (IDP) framework, or in the case of Land Affairs, within the land reform process. These processes allow for the integration of institutional and financial constraints with spatial and infrastructural development, and are intended to take account of social and environmental concerns. These plans both dictate the areas of new settlement development, as well as specify the upgrading required for existing settlements.

Similarly, the Water Services Act requires Local Authorities and water services providers to produce Water Services Plans. These plans also provide a proactive means of influencing Local Authorities to implement the Strategy.

The key stakeholders who may be influenced in this process are :-

- **Local Authorities** (which include the local, representative, district and metropolitan councils),
- **The Department of Constitutional Development and Provincial Affairs,**
- **The Department of Housing,**
- **The Department of Land Affairs,**
- **Provincial Departments of Housing, Planning, Land Affairs and the RDP offices.**
- **DWAF: Water Services**

5.3.2 Intervening in Service Provision and maintenance

Local authorities are Constitutionally mandated to provide municipal services to all people within their areas of jurisdiction. This includes the construction, operation and maintenance of these services, as well as ensuring that services are financially and administratively sustainable. The IDPs and the Water Services Plans provide the framework within which the Local Authority or Service Provider can be influenced to provide services consistent

with the requirements of this Strategy. However, Provincial or National government (or district/regional councils) is required to provide these services in areas with few resources and little capacity, and where appropriate, these agencies must be influenced.

A number of national departments are also involved in policy formulation, legislation, capacity building, and financing with respect to the services required. These agencies can be influenced to modify policy within a more formal co-operative governance programme. In this respect the following stakeholders must be involved in co-operative government schemes to influence the servicing of settlements: -

- **The Department of Constitutional Development** (in terms of specifying levels of service, and the financing opportunities.)
- **The CD: Water Services**, (in terms of water supply and sanitation services, and Water Services Plans),
- **The Department of Environmental Affairs and Tourism**, (in terms of solid waste management services),
- **The provincial Departments of Local Government and Public Works** (in terms of channelling finances, and building capacity for local authorities.)
- **The National Sanitation Task Team and NaSCO**. (in terms of their influence over national sanitation policies.)
- **NGOs and CBOs** (in terms of the influence these groups may have over service provision).

The Local Authority (or its designated service provider) is ultimately responsible for selecting, delivering and managing levels of service. These authorities should, therefore, be the primary target of awareness and capacity building with respect to the water quality effects of different levels of services. This is most appropriately done through local authority organisations and the ongoing provincial government training programmes run by the Department of Constitutional Development.

5.3.3 Influence over the use of services

Water quality effects can only be managed when the services provided are used appropriately by the community, or where vandalism of the services is minimised. In this respect DWAF should encourage services that can be appropriately used by the community, or services that do not contribute to misuse or vandalism. DWAF should also provide information that can become part of other campaigns, for example primary health care campaigns or the Masakhane Campaign. Similarly, DWAF should encourage capacity and awareness building to promote the appropriate use and maintenance of services.

The agencies which must be influenced in this respect include:-

- **Local Authorities** (particularly councillors),
- local **community health workers** and **clinics**,
- **NGOs**, and **CBOs**.
- provincial and national **Departments of Health**,
- **DWAF: Water Services** and
- **Department of Environmental Affairs and Tourism**.

5.4 A long term strategy

While the process of influence, co-operative governance and regulation is appropriate for the site specific implementation of the strategy, influencing policies at a National level will ensure the continued implementation of the Strategy without DWAF's continued involvement. This process may take the form of influencing and potentially modifying policies and legislation in the Department of Constitutional Development and the Department of Land Affairs of the inclusion of basic awareness training modules on the strategy, which may be taken up in these Departments' training programmes. This is known as the "National Strategic Process" and is described in more detail in Chapter 7.

6 FINANCING INTERVENTIONS

Chapter 6

This chapter provides a basis for identifying appropriated means to finance interventions under the Strategy. This is done by:-

- Outlining national government policies towards financing in this area.
- Outlining what financing sources are available in this area.
- Addressing the affordability of waste services
- Assessing the national cost of implementing the Strategy.
- Outlining a way forward with respect to financing the Strategy.

6.1 Introduction

There is a strong political and social commitment to redress the inequitable access to services and to lift all South Africans to higher levels of services. But there is a clear lack of capacity and financial resources at local government level to implement and maintain even the most basic levels of services. This is exacerbated, in many areas, by a culture of non-payment for services. This is the most significant hurdle with respect to the implementation of the Strategy.

However, significant resources are being directed into the provision of services and housing, mostly for those settlements where pollution problems are most severe. This provides an opportunity to tap into these resources to give effect to the Strategy. This chapter provides a brief introduction to these funding sources, and where these resources could be used to fund interventions under the Strategy. Further sections of the chapter address the affordability of increased levels of service and the national cost of the Strategy.

6.2 National policies

National government is keenly aware of the need to improve the quality of life for people living in poorly serviced settlements, but also of the limited funds to address the backlogs in services left by the previous regime. Government Departments have consequently made a number of investment vehicles available to address financing of the planning, upgrading and servicing of settlements. But they have, through the Municipal Infrastructure Investment Unit (MIIU) and Fund (MIIF), established several key policy principles that will affect the use of these funds. These are:-

- Government should not set national standards higher than the basic RDP levels.
- Local Authorities should be encouraged to adopt shorter-term goals of universal coverage to these basic levels.
- Grant financing for these levels should be limited to *once-off capital* for on site infrastructure. Only modest amounts for bulk infrastructure should be supplied, and only where the supplier cannot afford even a basic level of services from own sources.
- Consumers should be able to demand services above these RDP levels, provided that they pay for the full costs of the services.
- Consumers should pay the full recurrent costs of services within an area, and there should be no operation and maintenance subsidy entering an area from outside.
- The tariff structure for water and sanitation should include a lifeline tariff, plus a rising block tariff which increases with consumption.

This makes it clear that RDP levels are considered the basis, and anything above this level is regarded as a community desire, and must be paid for by the community. More importantly, O&M costs will not be supported from outside the Local Authority area of jurisdiction. This is apparently in conflict with this Strategy, which is based on the requirement for environmental protection (and not the community) driving the need for higher levels of

service. There is consequently a need for developing a common approach to grant financing in this area. This issue is explored in more detail later in this Chapter.

6.3 Potential sources of financing for the strategy

There are a number of funding sources that are aimed at different aspects of the planning, development, upgrading and servicing of settlements. While these sources are not specifically intended for financing the Strategy, they provide for the funding of services, which may be consistent with the Strategy. These sources are described below.

6.3.1 Consolidated Municipal Infrastructure Programme

The Consolidated Municipal Infrastructure Programme (CMIP) integrates a number of short-term grant-funding programmes that were administered by a number of departments, into a single programme under the auspices of the Department of Constitutional Development. CMIP is designed to further the aims of the RDP through the provision of funds for labour intensive projects to provide internal bulk connector infrastructure. These grants can be used for new bulk services schemes, upgrading of bulk services schemes, and the rehabilitation of existing bulk services schemes. The principle of CMIP is that the full capital cost of a basic level of service (up to R 3000 per household) should be subsidised by the national budget, and that additional costs should be carried at a local level. However, CMIP is not intended to provide for sewerage infrastructure.

CMIP grants can also be used to leverage additional funds. Used together with the housing subsidy funds (described below), CMIP funds provide a valuable source of funds to implement the levels of service recommended by this Strategy.

6.3.2 Home owner subsidies

The Housing Subsidy Scheme is intended to allow the poor to acquire affordable residential property, with secure tenure, and to ensure minimum health and safety standards. These subsidies are linked to income so the poorest receive the greatest benefit (Table 6.1).

Table 6.1 The subsidy amounts available for different income levels.

Monthly household income	Subsidy amount
R0-R1 500	R 15 000
R1 501-R2 500	R 9 500
R2 501-R3500	R 5 000

These funds are available as:

- Individual subsidies
- Project linked subsidies (most frequently used)
- Consolidation subsidies (Applied for by developer)
- Institutional subsidies (Provides for rent-to-own schemes)

The Housing Subsidy Scheme is primarily intended for the rapid provision of low-income housing. It could, nevertheless, be argued that to ensure basic health and safety standards, some of the subsidy should be used to supply services that limit pollution of the environment. However, provincial Departments of Housing are often hesitant to divert significant parts of the subsidy into underground services, preferring to spend money on visible housing provision. Communities and individuals may also rather spend the subsidy on bigger houses. However, if the link between community health and better services can be demonstrated, then use of this subsidy for improved service levels is justified.

The Housing Subsidy Scheme also makes provision for higher subsidies where the soil conditions would require more extensive foundations for the houses. This provides the opportunity to influence the housing subsidy policy to recognise that higher subsidies may be required where the receiving water environment is particularly sensitive. Influence over these

policies should also focus on convincing stakeholders that in terms of community health it is often better to live in a smaller house, with good services, than in a larger house with poor services.

The Department of Land Affairs provides a similar settlement grant in land restitution claims, but these subsidies are not linked to geotechnical conditions.

6.3.3 Pollution levies and catchment levies

The National Water Act makes provision for the payment of pollution levies and catchment levies. These funds are specifically intended to promote the protection of the water resource and could be tapped to support both the capital and operational costs of providing a higher level of service. However, it is important that these funds are only used to cover the *incremental* costs associated with providing the higher level of services required to protect the water environment. This is important when considering the financial sustainability of higher levels of services provided to poorer communities. These funds would be administered by the Catchment Management Agency, or DWAF where these agencies have not been established. However, the Department of Finance requires that these levies, if collected by central government, should revert back to the central fiscus. This means that special arrangements would have to be made to make these monies available for pollution management. Some Water Boards have funded service provision in their areas of jurisdiction, particularly where they perceive these services to improve the quality of the water they supply. These agencies could be approached in this regard.

6.3.4 Donor funds

Whilst donor funds are not the preferred source of funding, particularly for the operational costs of higher levels of service, there is significant donor funding of projects in this area. In particular, donor funding intended for social upliftment and environmental protection could be leveraged using this Strategy as a basis. Donor funding can also provide a critical kick-start to processes, which can later gather their own momentum. For example donor funds may be used to put in well serviced dwellings, which can then be bought by owners using Housing Subsidies and support from CMIP funds, which can then be used to put in more serviced dwellings (i.e. a rolling fund).

6.3.5 Municipal Rates

A common theme in the use of subsidies and national funding sources is that funds will only be provided if the services are regarded as financially sustainable. This means that the community must pay for the costs of maintaining the service. Unfortunately, the more densely populated settlements are usually the poorest, and most in need of higher levels of service. Higher levels of services in poor communities are not affordable and place a drain on the Local Authority. The resultant poor maintenance of services is perhaps one of the most significant water quality problems associated with settlements. The greatest difficulty in funding the Strategy, therefore, appears to lie with the recovery of the costs associated with the operation and maintenance of services. This is addressed in more detail in section 6.4.

6.3.6 Mayibuye funds

The purpose of this programme is to provide low-income households with land for residential and income generating purposes. This programme is funded by the Department of Land Affairs and is administered through the provincial Departments of Housing and Land Affairs. Mayibuye funds have been used to buy land for housing purposes, and their greatest value is to speed up greenfield schemes. The programme is limited to:-

- land acquisition
- pre-planning investigations
- town planning and preliminary engineering design
- site pegging and land survey

- community liaison
- project management
- township establishment
- conveyancing
- the settlement process.

These funds are, therefore, not directly available for the needs of this Strategy, but can be used within the planning process to ensure well planned and laid out settlements. This can play a significant role in addressing the future pollution from the settlement.

6.3.7 Private-Public partnerships

This is becoming an increasingly popular way of promoting service delivery. In these schemes private sector funding is used to fund the capital costs of service delivery, which will then be recovered by selling the services to the community, or to fund operation and maintenance costs. A number of these schemes have been initiated in South Africa over the last year. The success of these schemes still has to be demonstrated, but they nevertheless provide an opportunity to influence service delivery to meet the requirements of the Strategy. Funding for capital projects may also be used as collateral which can be used by the community to secure private sector loans, which can be paid off by the community leaving the capital sum untouched.

Various NGOs and quasi-government organisations have contributed to the funding of sanitation improvements e.g. Independent Development Trust Capital Subsidy Schemes, and the Community Infrastructure Programme. These, as well as local community efforts to improve their surroundings or services at their own cost could be promoted. Similarly, subsidies (or part of the subsidy) could be used as surety at private banks instead of providing the loan directly to developers. Individuals could gain access to loan financing using this as surety without touching the original grant.

6.3.8 Own funding

In many cases the community may be willing to fund interventions themselves. This can be particularly useful if the community owns the land, and in larger communities can represent a significant source of funds. This approach is however not appropriate for poorer communities.

6.4 The affordability of services

The limitations set with respect to providing capital funds to finance high levels of services are primarily a result of the higher operating costs of these services - funding agencies are loath to provide services they feel are unaffordable, and hence financially unsustainable. Unfortunately, those communities which are the most densely populated and hence most in need of better services, are also the poorest and are least likely to be able to afford these services. While increasing cost recovery is critical for the implementation of the Strategy, the reasons for non-payment for services should be identified. These may include: -

- Service delivery is poor or non-existent.
- There is no metering.
- Many residents are unused, or unable, to pay for services.
- People are not prepared to pay for low levels of service.
- People do not pay for services they do not see i.e. underground services.
- Non-payment as a hangover from the past.
- A poor service-provider / consumer relationship.

Implementation of the Strategy must identify which of these (or others as yet unknown) reasons are the main cause(s) of non-payment in the settlement, and capacity and awareness

building should target these causes. Similarly, the *Masakhane* campaign must play a significant role in the implementation of the Strategy.

Nevertheless, the poverty of many of the communities in these settlements will still be the dominant factor in the affordability of services. The World Bank has recommended that poor communities could be charged some 3-5% for water and sanitation services (this figure is lower for wealthier communities), and some South African experts indicate that up to 8% of income could be used for these services in this country. The affordability of different services can then be based on average income for different communities, and on the average capital and operating costs of these services⁵ (see Table 6.2). The following service levels were chosen to illustrate affordability.

- RDP levels:- i.e. a standpipe within 200m and a VIP
- Intermediate levels:- yard connections, and an on plot option.
- High levels:- i.e. fully reticulated sewerage and sullage system.

Table 6.2. Average capital and operating costs for different levels of sanitation services

Unit Cost	RDP Levels	Intermediate	Fully Waterborne
O & M (R/a)	200	400	900
Capital Costs	4000	6500	11800

Note: These are average costs only, actual costs will vary on a site-specific basis.

Table 6.3 shows that, given the grant funding available to implement the services for the first time, high levels of services are only affordable to the formal suburban areas, but may be marginally affordable to formal townships. However, informal townships and rural settlements will not be able to afford high levels of service. Similarly, intermediate levels of services may only be marginally affordable in these areas. Unfortunately, the more dense informal township areas are more likely to be the focus of the Strategy, and are more likely to require higher (or at least intermediate) levels of services. Many of these areas are also already supplied with high levels of services.

Table 6.3 The cost of services reflected as a percentage of household income

O&M plus Depreciation Cost/Household income (%)	Level of Service	RDP Level	Intermediate (Yard connect: On site)	Fully Waterborne
	O&M plus depreciation	400	725	1490
Settlement Types	Ave. H/h. Incomes			
Formal Suburban	85 600	0.5	0.8	1.7
Formal Township	25 700	1.6	2.8	5.8
Informal Township	12 600	3.2	5.8	11.8
Rural Settlement	14 100	2.8	5.1	10.6
	Affordable			
	Marginally affordable			
	Unaffordable			

Table 6.3 therefore indicates that in most cases where pollution management is likely to be required, the operation and maintenance requirements for levels of services above the RDP level are unlikely to be affordable. This issue is addressed further in section 6.5.2

⁵ These costs have been based on van Ryneveld (1995) Water SA 21 (1), and corrected for depreciation of capital works, and to 1998 prices.

6.5 The national cost of implementing the Strategy

6.5.1 Estimating the national capital costs of interventions

The Strategy is based on identifying appropriate interventions in all four waste streams, some of which may not require significant interventions. Interventions will also be identified on a site-specific basis. It is therefore difficult to estimate the national cost of the Strategy. However, the relative increases in costs of higher levels of water and sanitation services (most likely to be the greater portion of the costs associated with the Strategy) can be calculated. The national costs of the Strategy can then be estimated by making a tentative estimate of the numbers of settlements that are likely to require higher levels of services using the CWSS data. Table 6.4 provides an estimate of these cost increases, and the percentage of settlements that may require higher levels of services.

Table 6.4 An estimate of the increase in water and sanitation capital costs for different levels of services.

Existing Services	Required by strategy	Cost Increase/Unit	% Increase	Estimate of % of Settlements <i>See Note 2</i>
BELOW RDP	RDP	<i>See Note 1</i>	<i>See Note 1</i>	N/A
RDP	RDP	0	0	50%
	Intermediate	1012	67	45%
	Fully reticulated	3235	216	5%
Intermediate	Fully reticulated	2323	92	1-2%
Fully reticulated	Fully reticulated	0	0	1-2% <i>See Note 3</i>

Note 1: As the national standard is RDP level in any event, the strategy has no cost implications here.

Note 2: This is based on the CWSS Data base and is a tentative estimate only.

Note 3: The problems within these settlements are related to poor O&M.

Table 6.4 shows that the increased costs associated with implementing the Strategy depend on the starting levels of service. However, the Strategy will aim for softer interventions like capacity and awareness building as the first option, and intermediate services as a second option. Relatively few settlements should, therefore, require significant increases in levels of services. Noting that the figures in Table 6.4 are tentative at best, these assessments show that the relative national increases in capital costs associated with implementing the Strategy are, therefore, not significant.

6.5.2 Financing the Operation and Maintenance Costs

Section 6.4 has shown that medium to high levels of services are unaffordable to the majority of South Africans. However, in many cases levels of service have already been installed in communities who can not pay the full Operation and Maintenance (O&M) costs of the services. In some cases this has led to poor O&M of the services, and consequent pollution of nearby water resources. It is also clear that in some of the more densely populated settlements, at least intermediate levels of services will be required to protect the water resource. This means that there is likely to be a gap between cost recovery and actual cost of services in many settlements. This gap is one of the most significant problems facing the implementation of the strategy.

This gap can be closed in a number of ways.

- Appropriate intermediate levels of services with lower O&M costs could be implemented.
- Consumer/service provider relationships could be improved, (i.e. improved cost recovery.)
- Funding of pollution abatement activities could be prioritised.
- Funding from outside the settlement or Local Authority could be used to close the gap.

Any number of these options are likely to be necessary in each case, and the final choice of means to close the gap is also likely to be site-specific. In addition funding from outside the settlement may only be warranted when the pollution problem is severe.

6.5.3 The cost of not implementing the strategy

It is difficult to make an accurate assessment of the costs of pollution from densely populated settlements. These costs include increased costs of water treatment, loss of amenity value and other economic costs to downstream users. These costs are associated with the eutrophication of rivers and dams. Previous assessments on the national costs of this problem have indicated that eutrophication remains one of South Africa's most important and costly water quality issues. Densely populated settlements are regarded as one of the most significant contributors to the problem, and the increased eutrophication related costs associated with pollution from these areas is likely to run to several millions of Rand per annum.

However, the costs of pollution from densely populated settlements also include the indirect costs of increased health care and the loss of labour associated with diarrhoeal disease. Estimates on a national basis indicate that some 43 000 South Africans die each year from diarrhoeal disease, and on average one in 14 people need formal treatment for diarrhoea each year. The annual health care costs incurred from these cases has been estimated as at least 3 Billion Rands per annum. While many of these costs are associated with water and sanitation services below the RDP requirement of a VIP and 25L per person, a significant proportion of these costs will be associated with pollution in settlements with poorly functioning high levels of service.

These data therefore indicate that the annual costs of pollution from densely populated settlements are likely to be considerable. The redirection of funding towards addressing this problem (i.e focusing on prevention rather than cure) may therefore realise long term financial benefits for the country.

6.6 Conclusions

Clearly the approach to funding pollution control measures in settlements, specifically in cases where higher levels of services may not be affordable, needs to be carefully considered. Most importantly, options that both provide protection to the water resource, but which are also affordable, need to be identified. It is nevertheless recognised that it is likely, particularly in the more dense settlements, that protection of the water resource may require services that are not affordable to the community. It is also clear that a lack of resources to ensure the proper operation and maintenance of services will result in more severe problems. This raises the issue of who pays for the extra, or incremental, capital and operating costs associated with these services? To complicate the matter, the extra costs of implementing the Strategy are likely to be available on a national basis, but may not be available within any Local Authority. There are four options to address this dilemma.

- 1) The incremental capital and operating costs of higher levels of services required for protection of the water resource could be paid for from national "green taxes". (if not available from within the Local Authority area.)
- 2) Options to trap and treat the waste before it reaches the water resource could be developed. These include wetlands, interception drains, litter traps and detention ponds. However, these do not address the possible health effects in the settlement, and are aimed at impact minimisation and transport management. As such these methods are not consistent with the pollution management hierarchy (See Section 2.2). The O&M costs of these interventions would also need to be covered.
- 3) The impacts on the environment could be accepted. This may involve the reclassification of the receiving water resource, or the acceptance of localised pollution effects. However, this approach is only recommended in extreme cases.

- 4) In the long term some funds could be diverted from health care (symptom management) to pollution prevention (cause management). The Department of Health has already recognised this need in an extensive environmental health programme, which could be supported as part of this strategy.

These options would have to be discussed in the National Strategic Process, which aims to establish a joint policy for the planning, development and upgrading of services in both a financially and environmentally sustainable way. This is addressed in more detail in the following chapter.

7 THE NATIONAL STRATEGIC PROCESS

Chapter 7

This chapter outlines the way ahead with respect to creating a suitable policy and organisational environment to promote the implementation of the Strategy. This is referred to as the *National Strategic Process*

7.1 Introduction

There is a clear moral and political responsibility on the South African Government to facilitate the provision of services to communities that have suffered most from the apartheid system. Most agencies directly involved in this process recognise the need for environmentally sustainable solutions to the problem, and that in most cases provision of even the basic levels of services will already reap environmental benefits. These agencies, therefore, remain primarily focussed on the provision of basic services in a financially sustainable way. These agencies also control most of the funding associated with service provision, and hence at present have the greatest say over the planning, development and servicing of settlements.

The focus of this Strategy, on the other hand, has been on protection of the water resource. The Strategy has had a broader view of potential pollution problems and has included solid waste and stormwater management services. The need for financial sustainability has nevertheless been recognised. Poorly operated high levels of services also present the greatest threat to the water resource. Nevertheless, the different focus of this Strategy, particularly given the limited human and financial resources to deal with the problem, will make it difficult to implement and finance interventions in many cases.

The major challenge for this Strategy, therefore, lies in the development of a common vision and approach for the provision of services and housing in both an environmentally and financially sustainable manner. The movement from a common understanding of the problems, to joint policy formulation, also reflects a move from influencing other stakeholders, through co-operative governance schemes, eventually to the formulation of joint regulations to ensure the implementation of management practices and minimum service levels. This “*National Strategic Process*” is aimed at creating the right policy and organisational environment to promote the implementation of the Strategy.

The *National Strategic Process* is described in more detail in this chapter, and is presented diagrammatically in Figure 7.1. This is done by describing the actions required to create a conducive policy and organisational environment: -

- within the Department of Water Affairs and Forestry
- within other National Government Department’s
- within Local and Provincial Government.

7.2 Implementing the Strategy within DWAF

Implementation within DWAF must occur both in the head office component and in the regions, and should first be aimed at *influencing* the Water Services branch to implement the Strategy. This can be done by setting up joint committees (or by influencing the existing NaSCO) both at head office and in each region. In essence these committees should start balancing the requirements of providing water and sanitation services with the need to protect the water environment. The approaches presented in this document should guide this process.

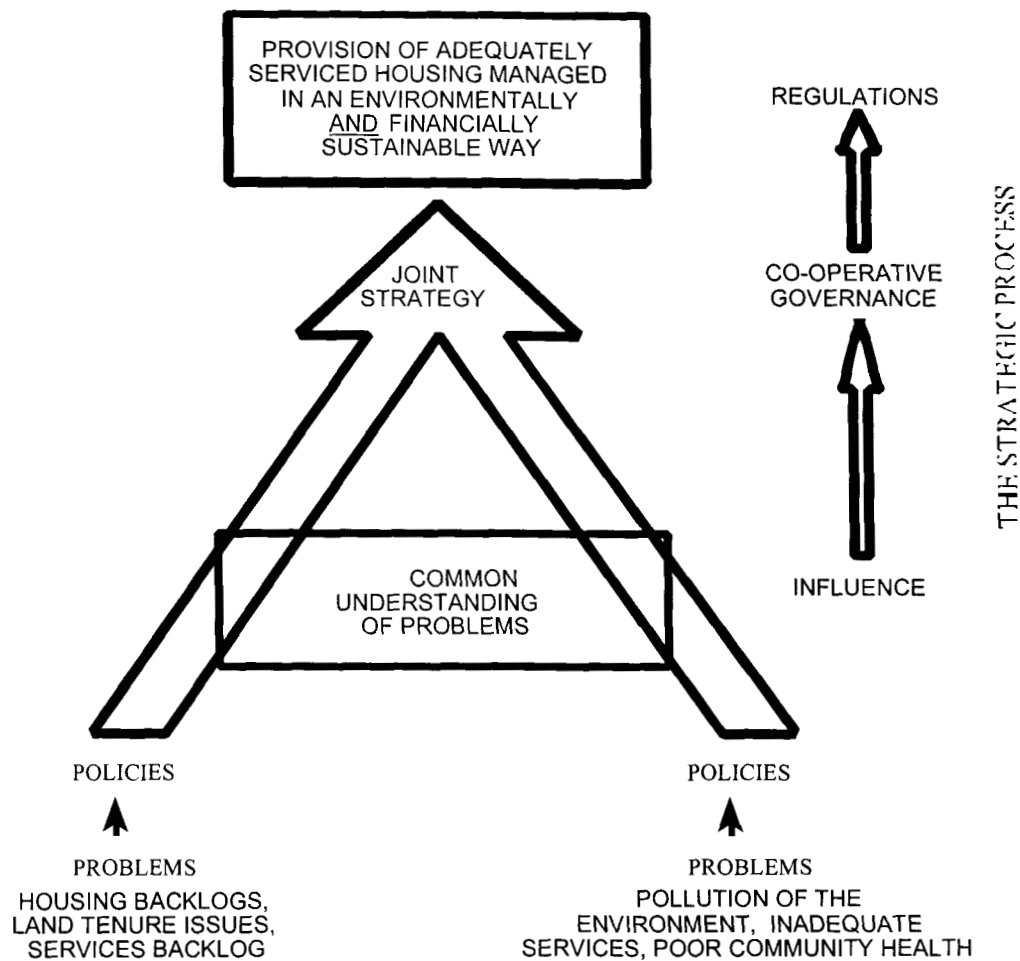


Figure 7.1 The vision for the Strategy, demonstrating the need to develop a common approach with respect to managing the water quality impacts of dense settlements. This diagram also outlines the *National Strategic Process*, as well as the process of implementing the Strategy in any given settlement.

Co-operative governance, which should follow this influence process, will be ensured if these committees, both at a regional and national level aim to produce joint policy statements to guide the provision of services. It is not considered appropriate at this stage to attempt to *regulate* the water services outside of the Water Services Act.

Implementation within DWAF should also investigate the staffing structure within the water quality management function. Most importantly existing posts, particularly within the Urban and Agricultural sub-directorate and in the regions, should be filled. Staffing should also move towards fulfilling the work study recommendations for staff in these directorates. Similarly, inclusion of staff with social skills both in the head-office and regional office component is critical.

The following action plan is recommended to implement the Strategy within DWAF:

- 1) Establish and maintain communication with Water Services. This should have the objective of integrating the requirements of the strategy with the Water Services Plans.
- 2) Address the staffing needs in both the regions and in the head office component of Water Quality Management. This includes meeting work-study recommendations for staffing, as well as the appointment of staff with community liaison skills.
- 3) Ensure co-ordination between the resource- and source-directed strategies, particularly with respect to the requirements of the Water Resources Classification system.
- 4) Develop and institute training programmes to train DWAF staff with respect to the Strategy. Two courses are suggested, a short Familiarisation and Introduction to the Strategy (1 day), and a longer Implementation of the Strategy course (2-4 days).

7.3 Implementation within other National Departments

Implementation in other National Departments must be aimed at *influencing* policies and strategies with respect to the planning, development, servicing and financing of settlements. Influence should be aimed at finding the balance between the rapid provision of adequately serviced housing and land, with the need to protect the water environment. Communication with other key national and provincial departments must be fostered, and it is recommended that communication be established with:

- Department of Water Affairs and Forestry-WQM (Chair)
- Department of Constitutional Development
- Department of Land Affairs
- Department of Environment Affairs and Tourism
- Department of Housing
- Department of Health
- Representatives of Local and Provincial Government
- Representatives from NGOs and CBOs

Communication should move from a common understanding of the problems of each of the Departments, towards the formulation of a joint policy and eventually regulations to guide Local and Provincial government (see Figure 7.1). This Strategy can serve as a basis for the deliberations of this committee, but it is recommended that an easy to read guide is also produced by this committee. This guide, if endorsed by all the members of the committee, would meet the requirements for *co-operative governance*.

The following action plan is recommended to implement the Strategy within other national government departments:

- 1) Establish a communication with the members outlined above. This may be initiated by a National workshop.
- 2) Develop a joint policy to ensure the planning, development and upgrading of settlements in a financially sustainable way, and which supports the implementation of the Strategy.
- 3) Produce a procedural guideline on how to finance the implementation of the Strategy.

7.4 Implementation of the Strategy within Local and Provincial Government

This role lies predominantly with the DWAF regional staff, and should begin with building a common understanding of the problems, move through influence and co-operative governance, to (if necessary) the formulation of Municipal bylaws or Provincial ordinances to govern the servicing and development of settlements.

It is important that the regional offices be given greater powers to enter into this negotiation process, to decide on site specific alternatives, and to issue licenses under the National Water Act. (Catchment Management Agencies will eventually be implementing the Strategy at this level.)

The following action plan is recommended to implement the Strategy at a Regional level:

- 1) Hold provincial workshops to introduce the Strategy to regional staff and to Local and Provincial government.
- 2) Identify the stakeholders who should contribute to the process of identifying and implementing interventions.
- 3) Prioritise the settlements in the region for management attention.
- 4) Use the structured-facilitated process to identify and list appropriate interventions.
- 5) Initiate intervention on an influence basis, form joint committees or river and catchment forums to implement joint governance schemes to oversee the implementation of

appropriate management practices, levels of service and interventions. If necessary modify local bylaws or ordinances to ensure implementation.

- 6) Identify appropriate means to fund the implementation and operation and maintenance of the management practices, services and interventions.

7.5 Conclusions

A number of issues are considered to be critical to ensure the sustainable implementation of procedures to manage the water quality effects of settlements. These are listed below.

1. The Strategy must be founded on balancing the need to protect the water resource with the need to rapidly develop, service and upgrade settlements.
2. The basic approach recommended is that the levels of service, management practices and interventions should be appropriate for the size and density of the settlement, and for the receiving water class. But that care should be taken not to recommend services which will not be maintained or operated effectively.
3. Management in any settlement must focus on the Physical, Social and Institutional factors which contribute to the water quality effects of dense settlements.
4. Management should focus on the processes that result in the Production and Delivery of waste in settlements, and on the relevant waste streams.
5. The structured-facilitated process should be used to determine which management practices, services and interventions are viable for the settlement.
6. Dialogue between DWAF-WQM, affected communities and local and provincial government is essential.
7. Capacity and awareness building, and community participation is critical to the sustainability of the management practices. In many cases little or no physical intervention may be needed, and management could focus predominantly on the “softer” issues where-ever possible.
8. A holistic approach to the problem in terms of both physical interventions and capacity and awareness building is critical.
9. The National Strategic Process should be implemented to create a suitable policy and executing environment for the Strategy.

APPENDIX A:

THE PROBLEM TREES WHICH INDICATE THE ORIGINS OF WATER QUALITY PROBLEMS FROM INADEQUATELY SERVICED SETTLEMENTS.

