The Role of Local Government in Integrated Water Resources Management Linked to Water Services Delivery

Report to the
Water Research Commission

by

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The publication of this report emanates from two WRC-funded reports, viz. *The development of a framework for the involvement of local government in water resource management, linked to water service provision* (WRC project K5/1688), and *The intergovernmental relations in the water services sector: a case study of Makane Local Municipality and Cacadu District Municipality* (WRC project K8/752.

Executive Summary

Rationale for project

Research for Project K5/1688 investigated the legislation for, and the support available to Water Services Authorities (WSA) to engage in Integrated Water Resource Management (IWRM), planning and implementation, using Makana Local Municipality as a case study. The final research report is the main deliverable and a culmination of the two-year project.

IWRM is an integrating management protocol and seeks to tackle some of the root causes of the management crisis in Water Resource Management (WRM) and services delivery, namely the inefficiencies and conflicts that arise from un-coordinated development and use of water resources. IWRM means a move away from traditional sub-sector-based approaches to a more holistic or integrated approach to water management that is based on a set of agreed key principles. At local government it will lead to the integration of a number of presently separate functions that all impact water resources, and will require a review of the institutional form of municipalities. For instance independent functions such as water service delivery, storm water management, (Directorate infrastructure), waste management (Dir. Health), economic sustainability and town planning (IDP), environmental management (Dir. Parks) will have to be integrated.

Successful WRM and IWRM depend on co-operation, the active involvement of all water users in an equitable manner without compromising the sustainability of vital ecosystems (National Water Resources Strategy, 2004). IWRM therefore aims to strike a balance between the use of resources for livelihoods and social equity and the conservation of the water resources to sustain its functions for future generations.

However, IWRM is a concept not accepted as the norm by the average citizen among whom most municipal councillors and officials can be classified. Considerable effort in education and information dissemination is needed for this approach to get the buy-in required. Experienced municipal staff identified some WRM functions, such as the consideration of water supply issues in the catchment or the quality of water in post wastewater treatment areas, as concerns that are outside their line function and responsibility. With the increasing number of catchment management agencies (CMA) being established, these attitudes will have to be addressed.

Aims

The aims of the research project (K5/1688) was to investigate the feasibility for the practise of IWRM at local government level in a small to medium category B municipality using Makana Municipality as a case study and to develop a framework of recommendations for action in order to achieve IWRM by defining the links between (Integrated) Water Resource Management and Water Services Provision. The “Guidelines for implementation of IWRM at local government level” developed by Burke (2007) and the Water Services Development Plan (WSDP) and the Integrated Waste Management Plan (IWMP) which are mandated responsibilities of local government’s service delivery, were the guiding documents. As a Water Service Authority (WSA) and Water Service Provider (WSP), Makana Municipality has to incorporate water resource protection, including the effects of land use, into their planning, development and maintenance of services. The values of the integrative aspects of IWRM in these activities were assessed. Parts of the IWRM protocols are to increase community awareness of water supply issues, so a dedicated education programme aimed at school learners were developed through action research.

Summary of project findings and recommendations

The principle outcomes of project K5/1688 was a case study research report on how Makana Municipality fulfills its duties as water services authority and water service provider. Included in this report were an environmental education plan for schools to introduce IWRM that was informed by a pilot program tested in seven local schools and a comprehensive survey of the legislative landscape in which local Government in South Africa functions principally as a water services Authority and Provider. In addition, a "Framework for Local Government to implement Integrated Water Resources Management linked to Water Services Delivery" was prepared as a separate report and will be published in Water SA in 2009.

Methods

The relevant legislative framework, strategies and planning guidelines were interrogated for the legislative review. Mandated support for local government from other spheres of government was analyzed and assessed

The "Guideline for the preparation of an Integrated Water Resource Management Plan" by Burke 2007 was analyzed to ascertain key tasks in common with the water services development plan and ascertain differences with other current mandated responsibilities. From this review the framework mentioned above was developed.

The case study of Makana municipality was developed from a critical analysis of its Water Services Development Plan and its Integrated Development Plan and a series of interviews with relevant staff of the Dept. of Water Affairs and Forestry, the councillors and officials of Makana Municipality as well as appropriate researchers and consultants.

Action research was conducted and educational strategies and materials tested at seven local schools, most from disadvantaged areas.

Results

The legislative landscape and intergovernmental relations in the water services sector.

Chapter 2 reviews the policy environment highlighting the policies pertaining to local government that predicate cooperative governance and other prescriptions that would support municipalities embarking on IWRM. Starting with the Constitution and surveying other local government statutes, water resources statues and strategies, all these instruments were examined for aspects of governance, coordinated strategic planning, financial support, service provision, intergovernmental forums and technical support structures.

Unfortunately, the Integrated Development Plans (IDPs) associated with the strategic planning do not yet sufficiently allow for integration and alignment of powers and functions, which is further complicated by the limited extent to which legally required cross-sectoral, managerial and sector programmes are effectively completed – notably the Water Services Development Plan (WSDP) and Integrated Waste Management Plan (IWMP).

The Internal Strategic Perspective (ISP) is DWAF's current medium-term approach to the management of water resources within the Water Management Areas. The ISP documents have been developed in line with the Provincial Growth and Development Plan (PGDP), local and district IDPs and WSDPs, as well as regional and other Environmental Management Plans (EMPs) and with plans and expectations of the Departments of Agriculture, Land Affairs, the Environment and others. "Water is very often a constraining feature in development and co-operative governance planning and implementation is essential in matching what is wanted with what is possible" (DWAF, 2005).

The allocation of water and sanitation services, powers and functions to local government implies that both the authority and provider functions is to be fulfilled by that municipality, although implementation (provider) capacity is limited at the local level.

Chapter 5

"The concept of cooperative governance embraces the realisation that a single sphere of government cannot handle the responsibility of a developmental state…and that not one sphere can be successful without the successful performance of the other spheres" (DPLG, 2006) especially in the water sector. The challenges of intergovernmental support and the potential role of a district municipality in supporting a local municipality are examined and the questions of intergovernmental support, particularly from provincial and national government, for water services and for IWRM, specifically in terms of the formulation of IWRMPs, is explored. Two lines of inquiry informed this section of the report; firstly questioning the extent and specifics of the support offered by provincial and national departments and secondly putting this support or lack thereof in the context of that envisaged in the IWRM Guidelines that suggests very specific and technical types of support.

The findings are grouped under the following subsections and highlight the pertinent successes and failures in the support structures:

Intergovernmental support for water services and it challenges,
Waste Management, Household Water Supply and Sanitation,
Water Catchments,
Intergovernmental support for the compilation of IWRM Plans.

General Findings – Makana Case Study

The situation in the Makana Municipality is no different to that occurring in many other municipalities of a similar size. Many of the problems listed below are common although Makana is a relatively functional entity so many more dire situations can be found.

Loss of experienced staff with attendant institutional memory loss and current staff who do not have appropriate technical skills or experience to collect and analyze relevant information to complete management and development plans without outside assistance of consultants.

A pattern of non-payment of service charges and rates accounts higher than the unemployment rate leading to financial constraints on Operations and Management with consequent deterioration infrastructure and interruption of services. The intergovernmental indigent grant does alleviate the shortfall and is well managed.

The human resources budget has increased due to substantial salary packages for Municipal Manager, Directors and Executive major and Councilors.

Environmental and health issues of greatest concern is the excessive domestic solid waste production due to non-compliant citizens, inappropriate sanitation options for the geology of the high density areas, poorly managed waterborne sewerage systems as well as informal settlement that produce sullage due to lack of drainage systems.

Citizens are generally apathetic and non-participatory and feel alienated. Only a small minority of citizens play an active role in championing positive environmental stewardship. The rapport and feed-back from councillors and officials is generally found wanting.

Poor environmental management resulting in poor water quality due to nutrient enrichment in the Bloukrans River, downstream of Grahamstown sewage treatment works and in Alicedale below the Evaporation Ponds. Nutrient enrichment is a problem due to the role of informal settlements, the overloaded sewerage works and littering.

Poor interdepartmental cross-management or consultation. Until a new Municipal Manager was appointed recently, this stemmed from the poor people-skills and the non-interactive management style for the previous incumbent.

Findings on Water Service Planning and Delivery

One of the critical gaps in local government was a lack of understanding of the full scope and value of the Water Services Delivery Plan and Integrated Waste Management Plan, a gap which has gradually been addressed with assistance of national government. Members of staff are unable to complete a WSDP and IDP independently. To be able to complete these detailed plans independently, a comprehensive data-collection system has to be in place, which is not the case. To be able to utilize such data, analytical and information development skills are required. This expertise is usually hired in the form of consultants, who seldom have the time or the capacity to train relevant resident staff.

A Water Services Authority such as Makana should also incorporate water resource protection into their planning, development and service provision. The ability of municipal officials to engage in these activities were found wanting.

Findings on the Ability to Practice IWRM

Cooperative governance at local government level which is at the base of all integrated resource management is generally not practiced in municipalities and definitely not in Makana in 2007. In terms aspects that impact Water resources management, the waste management section does not attend water section meetings; Finances do not attend water infrastructure meetings; senior managers seldom have planning meetings. Specifically there is a lack of comprehensive integration of planning, management and implementation, the three main aspects of management.

Recommendations and the Framework

The recommendations include changes in management approach and highlight the staff skills and training needed to improve the service delivery and operational capacity of a municipality. A training and human resources requirement grid was developed.

The “Framework for Local Government to implement Integrated Water Resources Management linked to Water Services Delivery” advocates a step-by-step plan to achieve an increased level of compliance with the WSDP and an improvement in the capacity of local governments to fulfill their mandated service provision roles and to move towards the adoption of sound integrated water resources management solutions, thus contributing to the achievement of the water-related Millennium Development Goals.

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ACRONYMS / ABBREVIATIONS

CAPE	Cape Action Plan for the Environment
CDM	Cacadu District Municipality
CMA	Catchment Management Agency
CMC	Catchment Management Committee
CMS	Catchment Management Strategy
DEAT	Department of Environmental Affairs and Tourism
DM	District Municipality
DMA	District Management Area
DORA	Division of Revenue Act (annual)
DPLG	Department of Provincial and Local Government
DWAF	Department of Water Affairs and Forestry
EMP	Environmental Management Plan
FBS	Free Basic Services
GDW	Grahamstown Disposal Works
GRP	Gross Regional Product
GVA	Gross Geographic Value Added
IDP	Integrated Development Plan
IGR	Intergovernmental Relations
IGR Act	Intergovernmental Relations Framework Act (Act 13 of 2005)
ISP	Internal Strategic Perspective
IWMP	Integrated Waste Management Plan
IWR	Institute for Water Research, Rhodes University
IWRM	Integrated Water Resource Management
IWRMP	Integrated Water Resource Management Plan
KCC	Kowie Catchment Campaign
LEAP	Local Environmental Action Plan
LGBC	Local Government Bargaining Council
LM	Local Municipality
MEF	Makana Environmental Forum
MIG	Municipal Infrastructure Grant
MSA	Municipal Systems Act (Act 32 of 2000)
NEMA	National Environmental Management Act (Act 107 of 1998)
NWA	National Water Act (Act 36 of 1998)
NWRS	National Water Resource Strategy
OFSWSS	Orange-Fish-Sundays Water Supply System
O&M	Operations and Maintenance
PDF	Portable Document Format
RDP	Reconstruction and Development Programme
SALGA	South African Local Government Association
SKEP	Succulent Karoo Ecosystem Plan
STEP	Subtropical Thicket Ecosystem Plan
VIP	Ventilated Improved Pit Latrine
WC/WDM	Water Conservation and Water Demand Management
WMA	Water Management Area
WPLG	White Paper on Local Government (March 1998)
WRC	Water Research Commission
WRM	Water Resource Management
WSA	Water Services Authority
WSDP	Water Services Development Plan
WSP	Water Services Provider
WUA	Water User Association

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CHAPTER ONE

1. INTRODUCTION by Fox & Haigh

This is the final consolidated research report of the WRC Project (K5/1688), "The Development of a Framework for the Involvement of Local Government in Water Resource Management, Linked to Water Service Provision" and the associated WRC Project K8/752, "Intergovernmental Relations in the Water Services Sector".

The focus of this final report is on Integrated Water Resource Management (IWRM) and the support extended, or available, to Water Services Authorities (WSAs) to engage in IWRM planning and implementation, using Makana Local Municipality as a case study. Accordingly, the key resource document is the WRC Project K8/682/1, "Integrated Water Resource Management Plan Guidelines for Local Authorities" by Burke 2007.

1.1 Aims

The principle aim of the research project (K5/1688) was to investigate the possibility and abilities for IWRM at local government level in a small to medium category B municipality using Makana Municipality as a case study.

The next aim was to develop a framework of recommendations for action in order to achieve IWRM at local government level by defining the links between (Integrated) Water Resource Management and Water Services Provision.

Due to developments after the acceptance of the project the aims were modified to be aligned with the "Guidelines for implementation of IWRM at local government level" developed by Burke (2007). These guidelines are in turn aligned with the Water Services Development Plan (WSDP) and the Integrated Waste Management Plan (IWMP) which are mandated responsibilities of local government's service delivery. As a Water Service Authority (WSA) and Water Service Provider (WSP) Makana Municipality has to incorporate water resource protection into their planning, development and maintenance of services including the effects of land use. It is in this area where the integrative aspects of IWRM are so valuable.

The third aim is also part of the IWRM protocols namely increased community awareness of water supply issues through a dedicated programme aimed at school learners within Grahamstown. Key objectives were to:

- Demonstrate and further populate the interactive, educational tool WATERMOD (http://www.ru.ac.za/institutes/iwr).
- Critically assess, modifying where necessary, the use of the model for both community education and its reception in the schools and community; and Municipal planning with regards supply issues.
- Identify other potential areas where similar interactive software products could be used to inform communities about water issues.

1.2 Outcomes

Broadly, the expected outcome of this project is a contribution to improve the capacity of local governments in fulfilling their role of adopting sound IWRM solutions and thus contribute to the achievement of the water-related Millennium Development Goals. The production of tools and methods to achieve this and products to improve public communication about IWRM are natural results. The findings of the policy environment investigations should also clarify the mandates of local government as a water user, a WSA and WSP and its role in Water Resources Management (WRM).

1.3 Rationale for project

Successful WRM depends on co-operation among all spheres of government and between various departments /directorates of a municipality, and the active involvement of water users and other organisations and stakeholders (National Water Resources Strategy (NWRS) 2004). This means that the natural, social, economic and political environments in which water occurs and is used must be fully taken into consideration.

IWRM may be defined as a process that promotes the co-ordinated development and management of water, land and related resources in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems. IWRM therefore aims to strike a balance between the use of resources for livelihoods and conservation of the water resource to sustain its functions for future generations. It promotes social equity, environmental sustainability and economic efficiency. Because the resource cannot be considered separately from people who use and manage it, a balanced mix of technological and social approaches must be used to achieve integrated management.

At the 2nd World Water Forum at Den Haag in 2000 it was formally recognized that better governance and IWRM was needed. Water should become everybody's business as it is an absolutely necessary element to the life and health of both humans and ecosystems, and a fundamental condition for development.

However, IWRM is still an emerging concept in WRM and is not the accepted norm by the average citizen. Most municipal councillors and some officials are ordinary citizens with no special resource management training. Considerable effort may have to be invested in education and information dissemination if this new approach is to get the buy-in required.

As an integrating management protocol, IWRM at local government will require the integration of a number of disjunct functions such as water service delivery, storm water management, waste management, economic sustainability and town planning including environmental management. Furthermore there appears to be considerable uncertainty on where the responsibilities of local government end when WRM is concerned. WRM in post wastewater treatment areas, and consideration of water supply issues in the catchment were concerns that experienced municipal staff identified as outside their line function and responsibility. With the increasing number of catchment management agencies (CMA) being established these uncertainties will have to be addressed.

1.4 Methods

1.4.1 Tasks

The following tasks were undertaken:

- The policy environment supporting IWRM was explored, including the National Water Act (No. 36 of 1998), Water Services Act (No. 108 of 1997) and the role of CMAs, involving Water User Associations (WUAs), Catchment Forums (CFs) and local government.
- Municipal mandates relating to environmental management and service delivery (especially related to water) was tracked through all the relevant acts.
- The need for water resource protection in relation to water related services (e.g. the provision of water supply and sanitation; and storm water management) and IWRM provisos, was examined and linked.
- The considerable challenges to local government to undertake responsible WSD, particularly where capacity and financial resources are limited, were examined in the context of IWRM. Added challenges are posed by municipal and Water Management Area boundaries that do not coincide.
- The institutional arrangements of the Makana Municipality were investigated.
- The present level of compliance by Makana Municipality to existing legislated norms and standards was assessed by examining the Water Services Development Plan. A number of recommended actions were drafted according to these findings.

In the light of the above findings, a better understanding of the requirements of practicing IWRM, using Burke 2007 as a guide and simplifying it, was developed. A framework for implementing IWRM was produced.

By initiating and assisting teachers to run enviro-clubs at schools, the role of environmental champion was assumed and tools which could be used to mobilize people to action with the goal of changing behaviour and attitudes, in the context of IWRM, were developed. These tools can be found in the accompanying CD titled Integrated Water Resources Management – teaching tools for schools. These tools are available for free distribution throughout South Africa and can be sourced at the IWR website http://www.ru.ac.za/institutes/iwr/

1.4.2 Work Plan

1.4.2.1 Networking by Project Team

The Project Team spent a large part of the initial stages of the Project in discussions with different representative groups, individuals and those attending workshops. These are recorded below.

1.4.2.1.1 Attendance at conferences and workshops

- The Institute of Municipal Engineers of South Africa, August 2005.
- The Water Institute of Southern Africa, July 2006 [paper presented].
- Kwa-Zulu Natal and Eastern Cape workshops introducing the Framework (Burke, 2006) to municipalities and DWAF staff.
- Eastern Cape workshop initiated to introduce the concept of toxicological testing at municipal level.

- DWAF Eastern Cape workshop on strategy for waste discharge charge system.
- DWAF Catchment Management Strategy workshop feedback.
- WRC meeting, Pretoria, with other IWRM programme implementation facilitators.
- Pretoria Aquatox Forum meeting where application of toxicology at industrial level was discussed.
- Logo Water Conference in Benoni.
- Presented our project at the Makana Research Group meeting.
- Attended an Honours seminar presentation on CMA strategies for particular WMAs and an honours seminar by Bill Rowlston on the relationship between IWRM and the Water Resource Strategy.

1.4.2.1.2 Local government discussions

- Cacadu District Municipality Director of Infrastructure and Technical Services, Environmental Health Officer, Principal Engineer, officer in charge of Environmental Affairs.
- Makana Municipality Mayor, Councillor Speaker, two portfolio councillors and two ward councillors.
- Makana Municipality Director of Community and Social Services.
- Makana Municipality Director of Infrastructure.
- Makana Municipality Assistant Director of Technical Services [Ms Pinky Hermanus, with whom much time was spent].
- Makana Municipality Assistant Directors of Parks and Recreation, Environmental Health, and Administration.
- Makana Municipality Skills Development Officer, Local Economic Development Officer and communications officer.
- The Supervisor and others in the Cleansing Department.
- Alicedale water quality unit.
- Provisional level environmental health representative to discuss the River Health Programme.
- Meetings with the Municipal Speaker of the house.
- Held a workshop at the end of the project to receive feedback on the framework from key municipal employers and councillors.

1.4.2.1.3 Institutional contacts in the functioning of Makana Municipality

The following questions were asked in Makana as well as other municipalities and Water Service Entities.

- How does the municipal system function?
- What are the networks, linkages and common meetings?
- How do these relations link to the provision of water services and water resources? This includes all governmental and municipal levels of interaction.
- What roles do NGOs and volunteer groups play and what is their value in the context of IWRM?

Groups that were contacted were:

- Nelson Mandela Metro, Director of the Water Division, and the Wastewater Treatment Officer.
- Amatole Water Board Chief Executive.
- Johannesburg City Director of Environmental Health, and the Parks Officer.

- Ethekwini Technical Support Manager, Pollution and the Environment, Director of Communications & their drama group.
- SALGA representatives.

1.4.2.1.4 Other Government Departments

- Department of Health, Makana.
- Department of Environmental Affairs and Tourism, and Coastal and Environmental Management.
- DWAF Regional Director of Water Quality Services (East London), Director in charge of CMA development, and Senior Water Pollution Control Officers.
- DWAF Regional Director Water Conservation and Demand Management and others at the Cradock Offices.
- DWAF Chief Scientific Specialist (Pretoria) water resource quality.
- DWAF Eastern Cape River Health Programme (RHP) Manager, Western Cape RHP Manager.

1.4.2.1.5 Individuals

- Prof Doreen Atkinson, consultant to World Bank on South African local governance.
- Mr Eddie Delport, retired Stellenbosch Municipality engineer.
- Ms Jenny Evans, DWAF Masibambane.
- Prof Heila Lotz-Sisitka and co at the Environmental and Sustainability Unit, Rhodes University.
- Prof Greg Ruiters and co at the Institute of Social and Economic Research, Rhodes University.
- NGOs and environmental groups based in Makana and Ndlambe Municipality.
- Albany Museum Education Unit.
- Prof Kate Rowntree, IWRM and CMA expert in the RU Geography Department, to discuss WRM and WSD links and possibilities for IWRM implementation.
- Questionnaires/ interviews of councillors: The interview group (6) comprised both new and experienced councillors and both parties were represented. The following portfolios were represented:
    - Land Housing and Infrastructure: 4
    - Environmental Disaster Management and Heritage: 1
    - Finance: 2
    - Social Services and Community Development: 1
    - IDP (Mayors office) 1
    - Local Economic Development: 3

1.4.2.1.6 Involvement with local environmental groups active in Grahamstown

- Was an active member of the Kowie Catchment Campaign.
- Attended RCE meetings.

1.4.2.2 Investigating IWRM Implementation

- Interaction with the municipality and DWAF continued throughout the project for municipal assessment in the context of IWRM and WSD and to examine feasible action for the implementation of IWRM.
- Addressed the city council on links between IWRM and municipal responsibilities.
- Wrote several articles for local newspapers.

- Resources obtained: IDP report, old and new organogram from the municipality and WSDP for Makana.
- Attended the greening of Grahamstown meeting where the project was reported.
- A field trip was undertaken to Grahamstown East to assess the present state of the environment to provide information for the framework and recommendations for a case study of Makana.

After much literature searching and discussions with DWAF and DEAT staff, the idea of solid waste management was chosen by the Project Team as the one key concept to focus on in implementing water resource protection. Few objectives with total participation, was the methodology adopted, based on the Makana Municipality Manager's outcomes from his own Business Administration PhD recently completed. Accountability was also emphasized by many experts on local authorities, and by the District Municipality, for both staff but especially for councillors. Finally action research focusing on best practice for education and awareness raising was realized as crucial in terms of partnerships between the local authority and community and business members, if the under-capacitated service provider have any hope of environmental clean-up and management.

CHAPTER TWO

2. THE POLICY ENVIRONMENT by Mccann M. and Haigh E.H.

The Integrated Water Resource Management Plan (IWRMP) Guidelines (Burke, 2007) argue that (IWRM) cannot be done in isolation but demands co-operative governance, particularly when considering the mismatch between political and catchment boundaries: "Water resource management is undertaken on a catchment basis but water service provision is on a political boundary basis, which emphasises the need for integration at all levels of government." While the need for integration within and between local, provincial and national government has long been recognised – co-operative governance is enshrined in the Constitution and is acknowledged as a key requirement in legislative documents such as the Municipal Systems Act (MSA, Act 32 of 2000), Intergovernmental Relations Framework Act (IGR Act, Act 13 of 2005) and the White Paper on Local Government (WPLG, March 1998) – the means for realising such integration remain elusive. In response to the ongoing challenge of integration, the IGR Act targets the provision of a framework in support of cooperative government; to promote and facilitate intergovernmental relations for the realisation of national priorities; monitoring implementation of policy and legislation; effective service provision and to achieve a coherent government. In respect of service provision, the IGR Act aims to avoid duplication and jurisdictional contestation. One of the mechanisms provided in support of effective service delivery is the establishment, or expansion, of intergovernmental forums and intergovernmental technical support structures at national, provincial and local levels.

National and provincial government are obligated to support and strengthen local government capacity in the exercise of its powers and functions, while the district municipality is intended to facilitate coordination across the three spheres and to, in turn, extend assistance to its family of local municipalities. The system of powers and functions and of support again highlights the need for cooperative governance, particularly where the water sector is impacted upon, and impacts, virtually all other sectors. Ideally, the local strategic planning process would see the due consideration and integration of all dimensions and sectors, including water and sanitation, health, pollution control, rural and urban development, environment and conservation, and economic and infrastructural development. Unfortunately, the Integrated Development Plans (IDPs) associated with the strategic planning processes of local and district municipalities do not yet sufficiently allow for integration and alignment of powers and functions, which is further complicated by the limited extent to which legally required cross-sectoral, managerial and sector programmes are effectively completed – notably the Water Services Development Plan (WSDP)[1] and Integrated Waste Management Plan (IWMP)[2].

The Internal Strategic Perspective (ISP) is DWAF's current medium-term approach to the management of water resources within the Water Management Areas. The ISP documents have been developed in line with the Provincial Growth and Development Plan (PGDP), local and district IDPs and WSDPs, as well as regional and other Environmental Management Plans (EMPs) and with plans and expectations

[1] The WSDP, required in terms of the Water Services Act, aims to assist municipalities and DWAF, in water services planning and in water planning and the water allocation process respectively. The WSDP "deals with the socio-economic, technical, financial, institutional and environmental issues as they pertain to water services (and)… also serves as a framework to ensure efficient, appropriate, affordable, economical and sustainable access to water services" (WRC-DWAF, 2007).

[2] The IWMP, required in terms of the NEMA, must integrate municipal waste management measures prescribed in the provincial Environmental Implementation Plans/Environmental Management Plans. (WRC-DWAF, 2007)

of the Departments of Agriculture, Land Affairs, the Environment and others. "Water is very often a constraining feature in development and co-operative governance planning and implementation is essential in matching what is wanted with what is possible" (DWAF 2005).

2.1. Developmental Local Government

Constitutional objectives of local government include providing democratic and accountable government and encouraging civil society involvement in local government matters together with ensuring and promoting social and economic development, a safe and healthy environment and the provision of sustainable services. In pursuit of the constitutional mandate of a developmental local government, the White Paper on Local Government (WPLG) was formulated with the subsequent promulgation of a suite of local government legislation within a financial framework afforded by the annual Division of Revenue Act (DORA). This suite of legislation includes the Municipal Systems Act (MSA) (Act 32 of 2000) and Intergovernmental Relations Framework Act (Act 13 of 2005) together with the Municipal Structures Act (Act 117 of 1998), Municipal Demarcation Act (Act 27 of 1998), Disaster Management Act (Act 57 of 2002), Local Government Finance Management Act (MFMA, Act 56 of 2003) and the Local Government Property Rates Act (Act 6 of 2004).

The powers and functions of the spheres of government are enshrined in the Constitution; the division of such powers and functions is developed upon in the Municipal Systems Act, the Municipal Structures Act and the subsequent Amendment Act (Act 33 of 2000), particularly in respect of the local government sphere (local and district municipalities). The allocation of water and sanitation services,[3] powers and functions to local government implies that both the authority and provider functions will be fulfilled by that municipality, although this is not necessarily the case – particularly where implementation (provider) capacity is limited at the local level. The authority function includes making by-laws and regulating competence; developing and implementing policies; determining tariffs and equitable share allocations; service level planning, prioritisation and implementation; capital infrastructure investment prioritisation and implementation; and decision-making on the means of service delivery or service provider arrangements.

In the case of a municipality gaining authorisation as a Water Services Authority (WSA), it retains the option and right to extend the provider function to an alternative agent acting under its authority. As such, the WSA retains ultimate responsibility for ensuring the delivery of the service but must review and decide on the most appropriate mechanism to provide the service. This process of engaging an external agent is provided for in the Municipal Systems Act, specifically through a *Section 78* process, whereby internal service delivery capacity is assessed and public consultation and a cost-benefit analysis are undertaken, before determining whether or not to proceed with a service delivery agreement for the function. The provider function relates to practical implementation to include day-to-day operations and repairs together with preventative and major maintenance as well as revenue collection and related financial management. In addition, provider functions extend to customer relations and communication, including information on the service being delivered as well as on health and hygiene awareness.

[3] The Constitution, Schedule 4 (Functional Area of Concurrent National and Provincial Legislative Competence), Part B: Water and sanitation services limited to potable water supply systems and domestic waste-water and sewage disposal systems.

Given the cross-sectoral nature of water, all legislation has at least some application to water resources and services management, although two key pieces of water legislation are the National Water Act (NWA, Act No 36 of 1998), which centres on IWRM, and the Water Services Act (Act No 108 of 1997), which is directed at Water Service Provision. The WSDP and IWMP, as components of the municipal IDP which must be subjected to annual review, are legal requirements in terms of the Water Services Act, the NEMA and the NWA. However, the latter plans are identified as having IWRM gaps since they focus on service delivery rather than the "full water management package", namely service delivery and resource protection. This shortcoming should be addressed by the comprehensive IWRMP (Burke, 2007), complementing both the WSDP and IWMP, if municipalities are to fulfil their developmental role while simultaneously maintaining environmental integrity in meeting their Constitutional obligations for sustainable service provision, social and economic development and a safe and healthy environment.

2.2 National Water Act 36, 1998

The NWA gives equal weight to groundwater and surface water and aims to ensure the protection of the water resource for sustainable use and ecosystem health. At the national level, the water resource pertains to rainfall and runoff, and aquatic ecosystems including rivers, dams, wetlands, estuaries and groundwater. At the Makana level, the water resource includes rivers, dams, groundwater and small pockets of wetlands (Gambiza & Palmer, 2004). Under the NWA, the guiding principles of an IWRM strategy are that all water use must be sustainable, equitable and efficient and water demands must be optimally reconciled with all available resources (DWAF, 2005). "These guiding principles recognise the basic human needs of present and future generations, the need to protect water resources, the need to share some water resources with other countries, the need to promote social and economic development through the use of water and the need to establish suitable institutions in order to achieve the purpose of the Act" (NWA, ch. 1).

In accordance with the Constitutional mandate for water reform, the NWA (1998) identifies National Government, acting through the Minister of Water Affairs and Forestry, as responsible for the achievement of the fundamental principles of equity and sustainability. National government, as the public trustee of the country's water resources, has overall responsibility and authority, within the guiding framework of the National Water Resource Strategy (NWRS) and within the broader framework of other environmental legislation, particularly the NEMA and the Environmental Conservation Act (ECA, Act 73 of 1989), over their classification and protection, use, development, conservation, management and control, including equitable allocation and redistribution. The ultimate aim of WRM is given as the sustainable use of water for the benefit of all users, recognising the need to protect water quality to ensure such sustainability and the need for integrated management of all aspects of water resources and, where appropriate, the delegation of management functions to a regional or catchment level. Catchment management strategies (CMSs) must be formulated within the guiding framework of the NWRS, which is binding on all responsible authorities and institutions.

The NWA provides for financial measures to support the provision of water resource management services and the implementation of strategies aimed at water resource protection, conservation of water and the beneficial use of water. Accordingly, the Minister of Water Affairs and Forestry is empowered to periodically establish a pricing strategy, following public consultation, which may set differentiated charges according to geographic areas, categories of water users or individual water users. The pricing strategy and water use charges aim to secure funding for WRM and for water resource development and

use of waterworks, and are further targeted at achieving equitable and efficient water allocation. Water use charges further aim to ensure compliance with water management practices, potentially through incentives and disincentives, according to the 'user pays' and 'polluter pays' principles, to encourage effective and efficient water use and reduced waste. Provision is also made for financial assistance as well as for liability and recovery of water use charges, whereby non-payment will attract penalties in terms of interest and possible restriction or suspension of water supply.

The progressive establishment of Catchment Management Agencies (CMAs), ultimately for all water management areas, is targeted for the purpose of delegating water resource management to the regional or catchment level and to involve local communities, within the framework of the National Water Resources Strategy (NWRS). Under the NWA, in water management areas where no CMA is established or where an established CMA is not functional, all powers and duties of the CMA vest with the Minister of Water Affairs and Forestry who is responsible for fulfilling the CMA's functions. Specifically, the Regional Offices of DWAF will manage water resources in their areas of jurisdiction until CMAs are fully operational. Such functions include the management, use, development, conservation, protection and control of water resources within the CMA's water management jurisdiction, which embraces the need to formulate CMSs and to promote coordination, participation and cooperative governance in realising their targeted principles and performance objectives. (Refer Karar, 2003). Until such time as CMSs can be drawn up by the future CMAs, the Internal Strategic Perspective (ISP) documents provide the framework for integrated decision-making and for DWAF's management of the water resources in each Water Management Area.

The establishment and powers or functions of water institutions further provided for under the NWA are: Water User Associations (WUAs) – essentially co-operative associations of individual water users undertaking water related activities for their mutual benefit; advisory committees – purpose and function-specific committees that are advisory in nature; and international water management bodies. Chapter 13 of the NWA provides for the appointment, powers and duties of authorised persons to access properties and undertake inspections on water use and further deals with access and rights over land in respect of servitudes, including waterworks on personal servitudes.

A provision of the NWA which may be one of the most challenging to effect is that of 'Monitoring, Assessment and Information' (chapter 14). The NWA recognises the critical importance of monitoring, recording, assessing and disseminating information on water resources. Part 1 of this Chapter places a duty on the Minister, as soon as it is practicable to do so, to establish national monitoring systems. The purpose of the systems will be to facilitate the continued and co-ordinated monitoring of various aspects of water resources by collecting relevant information and data, through established procedures and mechanisms, from a variety of sources including organs of state, water management institutions and water users.

The NWRS may be regarded as the implementation strategy of the NWA, supported by other legislation including the National Environmental Management Act (NEMA) and Water Services Act, and presents information regarding the manner in which water resources will be managed and the institutions established. The NWRS provides the legally binding framework within which all water resources must be protected, used, developed, conserved, managed and controlled throughout the country. Other related purposes of the NWRS are: to provide the framework for the preparation of CMS for Water Management Areas; to provide information on the intentions of the Minister of Water Affairs and Forestry with regard to water resource management; and to identify development opportunities and

constraints within a broad strategic perspective for each Water Management Area particularly in respect of water resource availability and limitations.

The National Water Conservation and Water Demand Management (WC/WDM) Strategy is a component of the NWRS, within the legislative framework provided by the NWA and Water Services Act whereby all relevant institutions are required to integrate WC/WDM into their strategic roles, responsibilities and activities (DWAF, August 2004). Both strategies will be subject to periodic review, at least every five years. The responsibility for WRM planning and implementation, covering the entire scope of WC/WRM, at the Water Management Area level will fall to the CMAs, while WSAs are ultimately responsible for service delivery within their municipal areas. The fact that boundaries do not coincide is raised as a further challenge to sustainable WRM. Each CMA must accordingly coordinate the activities of the various providers within its jurisdiction as well as those of other institutions, such as WUAs and bulk water suppliers.

The NWRS focuses on sustainable use of the country's limited water resources and aims to promote IWRM. The country's nineteen CMAs, to be established in terms of the NWA and NWRS, are intended to act as key agents in fostering co-operative relationships with the wide range of institutions and organisations engaged in the administration and management of various water systems. The success of IWRM is identified as depending heavily on the development of this co-operative framework, which must further facilitate the coordination of programmes as well as planning at all geographic scales, from local smallholdings to the international scale.

2.3 Water Services Act 108, 1997

The Water Services Act and MSA "are substantially similar in their underlying philosophies, especially with reference to community participation in local government and municipal service delivery" (WRC, 2002). The Act is underscored by three principal objectives in water services supply, being: social equity, targeting redress of past imbalances in provision of adequate access to water; financial viability, aiming to achieve full cost recovery for the costs of water services provision; and environmental sustainability, relating to the need to undertake sustainable development to safeguard resources for future generations (DWAF, 1999).

The Water Services Act is closely related to the NWA and essentially deals with the sustainable provision of basic water supply and sanitation services. Related to basic service delivery, the Act provides for the setting of standards and tariffs; for a developmental regulatory framework for water services institutions; for the establishment and disestablishment of water boards and water services committees and their powers and duties; and for financial assistance to water services institutions. The Water Services Act further aims to ensure that water services are monitored by the Minister of Water Affairs and Forestry and the relevant province, as well as by the relevant Water Services Authority (WSA), to ensure compliance with the Act. Where a WSA is determined to have not effectively performed any function imposed on it under the Act, the Minister and ultimately the Province may intervene by assuming responsibility for such function(s). Furthermore, the Act seeks to ensure accountability of WSPs, to promote effective WRM and conservation, and provide for the preparation and adoption of WSDPs by the WSAs.

In line with the requirements and provisions of the Constitution, the Water Services Act acknowledges both the authority of local government in terms of water and sanitation services and the responsibility of

national government to support and strengthen municipal capacity and to regulate the exercise of this authority. The Act transfers the responsibility for the provision and management of existing domestic water supply and sewerage disposal systems from national to local government. WSAs, which are always municipalities, are the key water service institutions and are obliged to progressively ensure that all existing and potential end users in their areas of jurisdiction gain access to efficient, affordable, economical and sustainable water services. The Act recognises that this duty may be subject to limitations in terms of the availability of resources and other natural features, such as topography, together with the need to conserve water resources and to equitably regulate access to water. Another factor which is identified as impacting on the WSA's obligation to provide access to water services is the duty of consumers to pay reasonable charges. The Act empowers WSAs to limit or discontinue the provision of water services, unless a consumer proves that they are unable to pay for basic services.

Most municipalities, including the Cacadu District and Makana Local Municipalities, have been authorised as WSAs since July 2003 in terms of the Municipal Structures Amendment Act (Act 33 of 2000). As WSAs, municipalities are ultimately accountable for the delivery of water services and sanitation to consumers, whether or not they fulfil the provider function. Three tasks are identified which need to be undertaken by the WSAs, beginning with adapting internal arrangements and putting governance mechanisms in place, such as by-laws and contracts, to effectively regulate water services. The second task is to take on the cost-effective and sustainable management and operation of water service infrastructure, which is progressively being transferred to the WSAs from DWAF. Finally, WSAs must make appropriate arrangements for the sustainable, efficient and effective provision of water services across their areas of jurisdiction.

In ensuring access to water services, the Act stipulates that a WSA must take into account, among other factors, the need for regional efficiency, low costs, achieving benefits of scale, the requirements of equity, the availability of resources from neighbouring water services authorities, as well as alternative ways of providing access to water services. In respect of the latter factor, the WSA must consider the most appropriate means of fulfilling the WSP function, as discussed above (see "Developmental Local Government"). Several major challenges facing the water sector are identified in the DWAF's Strategic Framework for Water Services 2003, including: limited financial viability and grant dependence; inadequate spending on maintenance and under-investment in assets; poor revenue management and associated late or poor rates of payment; inability to attract adequate financing translating into the need for considerable ongoing investment to expand and sustain water services infrastructure; and a highly fragmented institutional framework which may translate into the loss of economies of scale, administrative duplication and an inability to retain and attract good management and technical staff.

CHAPTER THREE

3. INTEGRATED WATER RESOURCES MANAGEMENT, by Fox & Haigh

3.1 The 'water crisis' as a driver for change

A series of new policies have been developed to tackle the so-called 'water crisis'. The facts are relatively well known:

1. The proportion of the world's population living in countries of significant water stress will increase significantly over coming decades.
2. Only a small percentage of wastewater is treated before it is disposed of into fresh water bodies. In some areas water resources are already over-abstracted, leading to severe, and sometimes irreversible impacts on eco-systems.
3. Many poor people lack access to water to improve their livelihoods.
4. Critically, 1.1 billion people lack access to safe drinking water and 2.6 billion people do not have access to safe sanitation (Moriarty et al., 2004b; 2004; WHO/UNICEF, 2005).
5. There is increasing vulnerability to water-related disasters, such as droughts and floods. Climate change is a strong driver of this change (Smits and Butterworth, 2006).

Historically, Water Resources Management (WRM) has adopted an engineering-led approach that focused exclusively on providing economically useful water and ignoring the consequence for environmental sustainability. In addition, this approach did not deal systematically with a number of dilemmas such as societal uncertainty, or consider the different social, economic and environmental interests in water management. In the past, externalities were not always explicitly considered, contributing to the many manifestations of the 'water crisis'. It is increasingly being realised that hard system thinking no longer holds, especially when dealing with the dilemmas of the current 'water crisis'. In fact, poor management or governance is said to be at the heart of these problems (Rogers and Hall, 2003). WRM clearly requires a "soft system" approach as defined by Checkland (1989) to deal with the highly complex network of interrelations between many actors and between the stakeholders and the water resource(s).

The interpretation of and suggested responses to the severity of the problems underlying the 'water crisis' is varied. Suggestions range from radical legal and management reforms to technological innovation to combinations of both. Environmentally-focused management reforms have, over recent decades become the most likely approach and water laws, institutions and policies are being overhauled in many countries. In order to address past failures, the concept of Integrated Water Resources Management (IWRM) is also being promoted and has become a leading paradigm in water management. IWRM seeks to tackle some of the root causes of the management crisis, namely the inefficiencies and conflicts that arise from un-coordinated development and use of water resources. IWRM means a move away from traditional sub-sector based approaches (WATSAN, irrigation, industry, etc.) to a more holistic or integrated approach to water management that is based on a set of agreed key principles. Taken together these principles offer a framework for analysing, and subsequently managing multiple uses of water in situations of increasing competition and conflict, and where water resources are scarce (or polluted) (Smits and Butterworth, 2006).

There is no one universally agreed definition of IWRM, but there is widespread agreement on what IWRM should achieve and a great deal of common ground in most definitions. A compilation definition drawn from a number of international sources is presented below and covers all aspects to be considered when undertaking IWRM.

The management approach is based on three basic principles:

- equity (social sustainability),
- efficiency (economic sustainability),
- environmental sustainability (Moriarty et al., 2004b).

IWRM focuses on achieving integration and coordination of planning, development and management:

- between land and water use,
- between surface water and groundwater,
- between water quality and quantity,
- between upstream and downstream areas, and
- between the freshwater system and coastal waters.

In addition, the management of natural and social systems should be integrated through:

- mainstreaming water in the national economy and in planning;
- an intersectoral approach to decision-making, where authority for managing water resources is employed responsibly;
- ensuring partnerships between public and private sector management;
- involving everybody and encouraging democracy;
- promoting and ensuring social equity through participatory and transparent governance and management without compromising the sustainability of vital ecosystems for future generations;
    - This may include support for effective Water Users' Associations, involvement of marginalized groups, and consideration of gender issues.

IWRM further aims to:

- Optimize supply. This involves conducting assessments of surface and groundwater supplies, analyzing water balances, adopting wastewater reuse, and evaluating the environmental impacts of distribution and use options.
- Manage demand. This includes adopting cost recovery policies, utilizing water-efficient technologies and establishing decentralized water management authorities.
- Establish improved and integrated policy, regulatory, and institutional frameworks. Examples are implementation of the polluter-pays principle, water quality norms and standards, and market-based regulatory mechanisms. The resource cannot be considered separately from the people who use and manage it and a balanced mix of technological and social approaches must be used to achieve integrated management (USAID; Schreiner; Rowlston, 2007).
- Consider the collective impact of sanitation, water supply, water reticulation, waste disposal, and urban stormwater runoff on ecological integrity *i.e.* river and groundwater health.
- Focus on present and future developments and fulfil the obligations of the IDP by facilitating *integrated thinking and vision* (Global Water Partnership, IUCN and UNICEF, USAID).

From the above descriptions it is clear that IWRM is an integrative concept, both at the level of water management (e.g. integration between quality and quantity, surface and groundwater) and at the

administrative level where management of water should be integrated into the management of the economy and society. In South Africa there are particular challenges in that, due to historical racial and gender inequalities, our implementation of IWRM needs to be consciously pro-poor and transformational (Schreiner pers comm. 2007).

Providing access to water and sanitation to those without in developing countries is the highest priority. Access to water is a human right, and is crucial in the fight against poverty. It is a cross-cutting factor in a number of the Millennium Development Goals (MDGs) (UN Millennium Project, 2005). These water service issues (the management of systems to provide access to domestic water and sanitation) are unfortunately frequently confused with WRM issues (management of rivers, groundwater etc.).

In many parts of the world, water services remain under-developed where the infrastructure is poor and poorly managed. Even in water scarce countries there is often scope for more appropriate development of water resources combined with measures to make its use more effective and efficient. Actual water crises tend to be diverse and local.

Below are some important aspects to consider when thinking about IWRM principles.

- **Scales and levels**. Water resource issues are strongly scale dependent. Many water conflicts take place at the local level e.g. on allocation of water from a local stream. Although important at the local level, these conflicts may be insignificant at larger scales, such as the basin.

- **Boundaries**. Whereas run-off obeys hydrological (catchment or watershed) boundaries, major socio-economic processes driving water use (e.g. development planning) take place within administrative boundaries such as a district or even a nation. Problems linked to the mismatch between hydrological and administrative boundaries are well-documented (see for example; Moriarty et al., 2004b; Pollard & Du Toit, 2004). The situation is made even more complicated when water distribution systems are superimposed on both catchment and administrative boundaries. The fact that all these boundaries do not match leads to a high degree of complexity in planning and analysing the impacts of certain interventions. This is one of the major reasons behind the fragmentation of responsibilities within the water sector. Although it is widely recognized that the catchment level is the most appropriate level for planning and management of water resources, this is increasingly challenged as being the best unit for implementation. In South Africa the approach has been to create regional Water Management Areas (WMAs) that straddle catchments (see the NWRS 2004).

- **Externalities**. As water resources are limited, and water courses (and aquifers) link different user groups to each other over large distances, the use (or pollution) of water resources by one user often causes impacts upon others (externalities). These externalities are scale-dependent. The sum of many activities at local level, which all have a limited impact at this scale, may cause large externalities at the basin scale.

- **Variability**. In most places, water resources availability is highly variable over time, between seasons and between years. In addition to biophysical variability, there is a socially-induced variability. Due to human actions in water management, availability of water for downstream users may become less or more variable especially where water transfer schemes occur. Some uses of

water are more or less constant (such as drinking water demand) whereas others are highly variable, such as irrigation water demand.

• **Uncertainty**. Water management implies dealing with hugely complex systems of causes and effect, and costs and benefit that are separated across time and space. To make things worse, information about many of these factors and impacts is often not available. For example, the impacts of climate change are uncertain and subject to many debates.

3.2 Moving towards IWRM

Implementing IWRM requires much change at all levels of society. Because it is so broad, covers many aspects of life and is a fairly new and emerging concept in WRM, considerable effort will need to be invested in education at all levels of society if IWRM it is to become a universally entrenched approach to water management. This new approach demands a change in the value system attached to water from one of casual acceptance and unthinking use to a careful consideration of all consequences of water use. Institutions are key to successful implementation where the public is involved and where societies' value systems need to be altered.

Institutional roles are changing in the water sector because of ongoing reforms. Most relevant to this report are attempts to implement IWRM as an approach to address problems of the 'water crisis', especially the root causes of uncoordinated development and use of water resources. Changes in the way water is governed are also being driven by linked processes such as decentralisation, attempts to strengthen community participation, cross-sectoral approaches to 'join-up' government and increasing involvement of the private sector and market-based mechanisms.

IWRM implies re-thinking systems of water governance. Changes underway in water governance include attempts to develop new laws, policies and institutions focused on the river basin or catchment level, generally including broad based participation of stakeholders. Local government, because, it is strategically located between the national policy-making level and communities or water consumers, that are part of the constituency it represents and serves, has a potentially significant role to play in these new processes.

In South Africa, public participation in WRM has been widely accepted and is reflected in the legislation as an intricate part of catchment management, involving co-operative governance. There are many platforms for public participation including the formation of CMAs and WUAs (DWAF, 2006). At a catchment level, participation will be taking place at many levels of IWRM – in determining a vision for the resource, setting the resource class, setting the Reserve, setting resource quality objectives, determining allocatable resources, drawing up of an allocation plan, license applications and issuing water use licenses, and auditing license holders. Local authorities and the public will be represented and hold responsibilities in all decisions (Lotz-Sisitka *et al.,* 2004). On a local level, environmental management is most effective when there is stakeholder engagement, with ownership and accountability more likely (http://www.IAP2.org).

Partnership working is also becoming popular as a strategic and operational approach to developing sustainable waste management. There is a strong consensus amongst local authorities in the UK for example, that partnership working is increasing and inevitable (Wilkinson and Craig, 2002). The

evidence base to support partnership working is poor and the impact and potential of partnerships in the waste sector has been weakly analysed and assessed (Slater *et al.,* 2006).

Participatory management has been shown to be most successful if the public is involved enough to be aware of the general goals and needs. Therefore, individuals and civil groups need information, skills and "water awareness" (GWP, 2005).

3.3 Roles of different players

IWRM goals can only be met if individuals and organisations fulfil new roles in effectively managing local water resources. To do this they need to possess the necessary competencies, including task-specific skills, a cultivation of general attitudes, awareness, values, knowledge and abilities.

Arming role-players with such competencies will not only entail *training* (the development of task-specific skills), but also *capacity building* (the cultivation of more general attitudes, values, knowledge and abilities to lay the necessary groundwork for training).

3.3.1 What are the appropriate institutional roles?

Firstly, organisations and agencies at all levels and across sectors should participate. This will be through:

- anchoring the coordination at the highest apex level;
- creating coordination bodies at the river basin level;
- devolving responsibility to the lowest appropriate level;
- and developing human and institutional capacity**.**

Civil Society Institutions (CSIs) should be engaged from the outset as partners. Non-governmental Organisations (NGOs) and Community-Based Organisations (CBOs) can play an important role in developing and communicating IWRM policies. CSIs and CBOs have considerable ability to:

- Advocate on behalf of nature and environmental protection;
- Develop and test new models and tools in water management;
- Increase awareness of the need for sustainable water management;
- Mobilise local communities to get involved.

Engaging role players and participants from institutions outside the water sector is a further crucial element to successfully move from sector based planning and management to collaborative holistic management. Sectors that must be engaged progressively are planning, land and agricultural management, economic development and mining.

Quoting from the Global Water Partnership website (www.gwpforum.org, accessed June 2006),
"Introducing IWRM is hard work! When people try to put IWRM into practice, they are faced with the apparently insurmountable difficulty of bringing together a very intricate socio-economic reality, the legacy of the past and its ingrained practices and beliefs, and the apparently non-reconcilable conflicting demands." In addition, officials are used to conducting their day to day business in a manner that had developed over a number of decades and are relatively entrenched in their approach. Not everybody will embrace change, especially if it involves more work and real effort to be put into effecting transition. It will require the joint effort of all stakeholders – stakeholders who, in most cases,

have generally acted in isolation of each other, or even consciously or unconsciously fought against each other. This presents one of the main challenges for government – rallying all stakeholders together and encouraging them to integrate their activities as advocated by IWRM.

3.4 IWRM related tools, instruments and advice

Inherent in an IWRM approach is the recognition that truly sustainable WRM involves managing demand, not just supply. Water efficiency must be addressed at several levels, both through technical means and through improved management practices. It is in management practises where some of the most radical changes are required. For example getting land managers especially housing, planners and water resource managers to collaborate on a regular basis.

3.4.1 Land use planning

An important topic for IWRM is the interface between water use and land use. Consequently, regulating land use is part of IWRM but traditionally is regulated from several separate institutions namely Housing and Transport, Development, Agriculture, and Conservation. The steady growth of urban agglomerations, often unplanned, means that the impacts of land use on water become of paramount importance. Urban growth leads to massively increased local discharges of waste effluent with serious impacts on surface and groundwater. In the same way, forestry and agricultural activities have significant impacts on both the quality and quantity of surface run-off as well as groundwater formation and quality. Land use planning should be a significant component of implementing national plans for IWRM, in drawing together the various impacts of population pressure or industrial land use on water, to ensure sustainable water impacts. Land use planning is vital for safeguarding environmentally vulnerable areas, wetlands and riverine ecosystems. However, pressure for land development is often intense, and there are frequent conflicts between the land requirements for housing, industry and roads and the need for nature protection.

Examples of tools for controlling land use include the following:

Zoning identifies areas where specific forms of land use are prohibited or where special rules apply. Examples relevant to IWRM are drinking water protection zones and zones where construction is not allowed because of flooding risks. Protection zones around wells and in recharge areas are useful for protecting groundwater and potable water drawn from wells. Protection zones along watercourses provides some protection against direct pollution, for instance from nutrients in fertilisers.

Construction permits are sometimes required before houses or infrastructure can be built in protection zones or around urban areas to protect water quantity and quality. Land use planning can be used as an alternative to structural flood protection.

Building regulations are likewise a means that can be employed to reduce vulnerability to floods.

Specific soil protection and erosion control measures, such as ploughing parallel to the contour lines and planting trees, can be prescribed. Special limitations may apply in designated nature or wildlife areas.

Waste disposal regulations, e.g. on locations of waste disposal sites, are important for the protection of groundwater.

Before controlling land use, a wide overview is needed on present land use, along with a vision on future land use. Additionally, adequate institutional capacity must be available for planning and for compliance monitoring and enforcement. This tool also has links to water resources assessment.

3.4.2 Water Conservation and Demand Management

Technologies for reducing consumption vary by application and context – e.g. drip irrigation to replace flood irrigation, and retrofitting and pressure reduction. In agriculture, crop patterns are modified to reduce water use from over-head sprays to drip irrigation. Shifting the management of irrigation water at field level to farmer groups (with governments retaining the responsibility for bulk supply) creates the possibility of more efficient use and can make volumetric charging possible. Use of indicators such as product labelling and access to technical support information is important as are water campaigns, awareness raising, and performance indicators. A useful technique is the water audit, which, by using simple procedures, can easily identify gross inefficiencies in water use in, for example, industrial plants. Improved efficiency of use is achievable in almost all situations, but the specific tools vary widely according to circumstances. For example, tariffs for water use are only effective if linked to volumetric use, with means of measurement such as meters or discrete volume measures. Efficiency is also ensured by providing a service that is used. Stakeholder dialogue helps tailor water management to meet the needs of society without waste. Ignoring the needs of special groups, such as women in the case of domestic water supply, or subsistence farmers in the case of irrigation, means that both capital and operational investments are often wasted.

Pricing is often effective in improving efficiency in municipal water supply and is being increasingly used in irrigation as management reforms can open the possibility of volumetric charging.

Economic Instruments such as tariff structures and creative approaches to moderate demand and reward licensing compliance are economic tools that can be used to encourage water use efficiency. Three basic principles are the user-pays principle, the polluter-pays principle and subsidise the good, tax the bad.

3.4.3 Reuse of wastewater

Sanitation is probably less integrated than water supply with WRM (Smits & Butterworth, 2006). Most of the current sanitation efforts go into providing people with safe and private sanitation facilities at the household. However, little attention is given to what happens with the waste afterwards, such as pollution through seepage from pit latrines or disposal of wastewater.

An area of particular interest for local government is the reuse of wastewater for irrigation. Reusing wastewater can be a way of reducing pollution and at the same time reducing treatment costs. In addition, it may reduce the need to develop other fresh water resources for agriculture. However, it may also bring about health and environmental risks if not done properly. In the past local governments have often reacted by banning this practice, not realising the negative impacts this may have on people's livelihoods. In some countries, especially in the Middle East and Latin America, progress is being made towards the planned reuse of wastewater. For a good overview see Scott et al. (2004).

3.5 IWRM in South Africa

South Africa has already accomplished the first radical step towards IWRM recommended above in that the policy reform has largely been accomplished and most of the important tenets of IWRM are incorporated in the National Water Act of 1998 and in the NWRS (2004). Unfortunately, nowhere in the act is IWRM explicitly recommended or directed. Similarly the Water Services Act was redrafted and promulgated in 1997 and is an important management and planning instrument for Local Government. The Water Services Development Plan has a fairly comprehensive task list but again falls short of suggesting a completely holistic approach to WRM in that it does not explicitly require the incorporation of land based management such as solid waste and water services management or sufficiently emphasise the importance of water quality management.

The South African context is characterized by high levels of economic inequality, exclusion of the black majority and women from the economic mainstream and high levels of poverty and lack of access to services for the black majority in particular. In the context of water management, water scarcity in South Africa further sets the context in which IWRM must be applied. It should be noted that the poor black majority, particularly in rural areas, are the people for whom water scarcity is most intense. Therefore, the challenge is to ensure that water is available for meeting both economic and social needs and that water is considered both an economic and a social good. In a water scarce country, where a growth rate of 6% is the aim, the development of water resources infrastructure such as dams and interbasin transfers must be twinned with significant programmes of and investment in water conservation and demand management. These parallel programmes must also serve the process of transformation and reallocation of water to the black majority (Schreiner, 2007).

The implementation of IWRM in South Africa should contribute to the national developmental programme including the Accelerated and Shared Growth Initiative for South Africa (AsgiSA) and to societal transformation, particularly with regard to inclusively in relation to race and gender. South African water policy is, therefore, focused on equity, efficiency and sustainability in WRM and the beneficial use of water in the public interest is high on the agenda.

3.5.1 What needs to be in place?

With the progressive establishment of CMAs and the appearance of the Catchment Management Strategy (CMS) in 2007, the way of devolving water management to a catchment based approach is in progress. Many unforeseen obstacles are arising as the progress is being made. Potentially the most difficult is the lack of foresight in terms of funding streams to ensure sustainability of the National Department agencies and the handing over of power from provincial DWAF officials to the CMAs.

IWRM goals can *only be met* if individuals and organisations fulfil new roles in effectively managing local water resources. Individuals need to possess the necessary competencies, including task-specific skills, and a cultivation of general attitudes, awareness, values and knowledge.

IWRM Implementation Programme at National Level:

- An information and education programme led by champions is crucial for success. Clear goals and benefits must be articulated.
- Need a government - stakeholder *interface to work*, with changes and adaptations on *both* sides. Closely allied to this is the role of elected private organisation representatives (organised agriculture, mining, and business/industry) and officials.

- Cooperative governance should be a standard management protocol with clear paths of communication and decision making between different sector representatives as mentioned above.
- *It should include* education programmes for staff at all sectors.

3.5.2 Integrated Water Resource Management and Local Government

Achieving IWRM is the ultimate goal in terms of sustainability, because then land use and economic and social development would be managed in harmony with available water, over exploitation would be minimised and resource protection would be maximised. It should be the holy grail of resource management. However, new concepts, especially internationally derived (Agenda 21 from the Rio Earth Summit of 1992) takes time to filter down to the level of local government. The way was paved in South Africa with the implementation of the National Water Act (1998) and the Water Services Act (1997). Implementation of these advanced new laws is proving to be a difficult process and losses of experienced staff have bedevilled the process even more.

3.5.2.1 International Perspective (Smits and Butterworth, 2006)

Local governments have a wide range of mandates and functions and institutional arrangements that are country dependant. Mazibuko and Pegram (2004) identify three categories of functions for South African local governments (see Boxes 1-3):

1) Development planning (specifically sector plans as well as integrated development planning processes).
2) Local environmental management which includes responsibilities for environmental planning.
3) Service delivery which includes water supply, wastewater discharge, and stormwater management.

Of course, the boundaries between these types of categories are not always clear. Each of these functions has links to WRM, as they involve either requirements for water resources (e.g. domestic water supply for new housing), or cause externalities (e.g. downstream pollution from sewerage systems). Local government is, therefore, a key actor in WRM, even though they are often not fully aware of this, seem to assign low priority to it and have limited capacity to properly do the job.

Based upon analysis of the literature there are two main approaches for local government to support implementation of IWRM:

1. *Engaging in new WRM institutions.* In many countries IWRM implementation has been taken up through the adoption of wide-ranging new policies, revision of water laws and establishment of new institutions for WRM. These reforms aim to manage water in a fully integrated way, largely based upon the catchment or the river basin as a unit of management. This is what Moriarty et al. (2004b) call "full", or institutional-based, implementation of IWRM. Local government has an important, but often neglected, role to play in these new institutions.

2. *Implementing IWRM through local actions.* A second way in which IWRM can be implemented is by adopting and following the underlying principles in the implementation of local water actions or projects i.e. in the day-to-day water business in which local governments are engaged. Moriarty et al. (2004b) call this "light", or principle-based IWRM. The basic idea behind the principle-based approach is that if all stakeholders from different sub-sectors apply these principles in their own work within their own mandate, better WRM will emerge**.**

Importantly, these two approaches are not mutually exclusive. Altering the institutional frameworks of governance is often laborious and time consuming whereas changes in approach can often be accomplished through functional alterations and implemented through staff training. Whichever approach is favoured or followed, elements of both will be required but above all strong leadership and vision is the key to success. Finding appropriate champions and developing a clear message extolling the benefits to be derived from this new approach is a prerequisite for success.

Local authorities can play an important role in overseeing the implementation of IWRM activities both within their boundaries and within their local and regional watersheds. They act both as regulators and as service providers and have a role in raising finance. Despite varying levels of jurisdiction over water services, local governments have both direct and indirect responsibility for the water security of their communities and their industrial base. In the context of IWRM, local authorities affect the aquatic ecosystems through their energy supplies, land uses (including zoning and impermeable areas), point and non-point sources of pollution, construction practices, public education, solid waste and urban drainage practices, among other aspects. Improved integration of the efforts of all the relevant actors toward commonly accepted goals for their water resources is necessary to improve the quality of water bodies and the security of the watersheds and aquifers on which they depend. The role of local authorities and governments in supporting IWRM is particularly strong where there are moves towards decentralisation and democratisation of planning and resource management. Local governments offer a strong forum for local participation, particularly through internationally recognised programmes, such as Local Agenda 21 planning, and can be instrumental in providing information and supporting dialogue among stakeholders and policymakers in communications with stakeholders. Local governments have a variety of economic instruments available to them to influence the behaviour of their citizenry. These include rate structures and charges, fees for permits and other governmental services, special taxes and surcharges, incentives (such as bonuses and rebates) as well as fines and penalties. These economic instruments are complemented by a variety of regulatory instruments, such as by-laws, which local governments can use to influence the implementation of IWRM practices within their boundaries.

The roles and responsibilities of Local Government have been highlighted in many recent publications and government websites: the National Water Act, National Water Resources Strategy; Burke, 2007 Chapter 4; Schreiner pers comm.; www.treasury.gov.za/mfma; and Mazibuko and Pegram, 2004. Extracts from the various acts that determine local government service delivery mandates are presented in Boxes 1-3.

3.5.2.2 Municipal responsibility/ involvement in WRM

IWRM, in its widest context, is not a direct legislated mandate for local government although it is implicit in many of the Acts and Policies (Boxes 1-3). The principal role of local government is water supply and sanitation delivery which has often overshadowed its role in WRM or in IWRM. Implementation, therefore, relies on linkages to functions and priorities already mandated, in particular the development and annual reconsideration of the Integrated Development Plan (IDP), the Integrated Waste Management Plan (IWMP) and the Water Services Development Plan (WSDP).

3.5.2.3 Authority functions of municipalities for IWRM

The authority functions of municipalities for IWRM include:

- control of development within the 100 year flood line and protection of wetlands and riparian areas;

- management of storm water (Category A, B Municipalities);
- disaster management as it relates to floods and droughts;
- refuse removal (Category A, B Municipalities); refuse dumps and solid waste removal (Category A, C Municipalities) plus control of litter, particularly as it relates to protection of urban rivers;
- pollution control through
  - control industrial effluent disposal to sewer systems,
  - appropriate disposal of hazardous materials,
  - management of grey water;
- ensuring provision of appropriate and effective sanitation (Category A, C Municipalities);
- ensuring provision of safe drinking water through management of drinking water quality;
- ensuring water conservation and demand management by water users to whom they supply water;
- integration of local level development planning with water availability – in conjunction with DWAF/CMA (Category A, B, C Municipalities);
- municipal health - now defined as environmental health;
- air pollution (Category A, B Municipalities);
- municipal parks and recreation (Category A, B Municipalities);
- beaches and amusement facilities, recreational water use (Category A, B Municipalities).

3.5.2.4 Municipal Directorates and Divisions that impact IWRM

Table 3.1 Municipal divisions concerned with IWRM	
Water Services Provision	***Directorates involved***
Surface bulk supply Groundwater supply Purification – reservoirs Distribution and metering at the area and household level Waste water treatment Household waste and grey water – sewage treatment Storm water Outfall monitoring	Engineering & Scientific services *Dams, pipes, pumps, reservoirs, roads, storm water canals, waste water, Vehicles, chemicals, data collection* Finance *Meter reading & billing* *Budgeting* Environment *Monitoring of rivers and wetlands* *Disaster management*
Tasks that impact IWRM	***Directorates involved***
Spatial planning and development IDP i.e. *positioning of cemeteries to limit their impact on groundwater; determining whether there is enough water available for a proposed development or activity.* Water Services Development Plans Integrated Waste Management Plans Waste management and cleansing Solid waste storage and ground water Waste management and storm water	Planning and development Engineering and infrastructure management i.e. roads Cleansing and social services Scientific services Financial planning Social services

3.5.2.5 Details of the principal objectives of IWRM for local government

Objective 1: To use water effectively (WCDM) DWAF's water management hierarchy of minimise, reuse/recycle, treat and release should be followed.

- Minimise losses of water by careful design and operation and regular inspection and maintenance of infrastructure. Feed information back to management on the Local Authority water services infrastructure and water management systems.
- Rapidly collect, contain and where possible re-use all potentially polluting water from sewage works, industrial sites, landfill sites and any other land use generating such water e.g. irrigation from parks.

Objective 2: Manage land use effectively for protection of the riparian zone (green corridors) and water resources and maintenance of biodiversity.

- Assess all development proposals according to protection of sensitive areas, maintenance of biodiversity and flood line regulations and in terms of available water services capacity – water supply, sewage and stormwater.
- Promote creative options for balancing development with maintenance of open space systems, ecosystem integrity and biodiversity.
- Address spillage from pipelines as soon as possible. Implement a contingency plan that will enable the early detection of broken or burst pipelines.
- Ensure equipment is well maintained and fully operational.

- Collect and dispose of waste in line with legal requirements and carried out by reputable waste contractors, with periodic duty of care inspections by the Local Authority.
- Develop and implement an incident reporting system that includes DWAF, for reporting of any polluting or potentially polluting incidents so that appropriate measures can be taken.

Objective 3: Prevent damage to receiving watercourses from runoff arising from urban drainage.

- Regulate development (land use) to minimise stormwater volumes, velocities and peak flows discharging to natural watercourses e.g. though porous paving, reduction in paved areas and retention on site.
- Design and operate stormwater management systems to minimise volumes generated and velocities and peak flows discharging to natural watercourses. This can be done through constructing earth lined canals and swales.
- Manage grey water effectively through onsite containment for evaporation and reuse, in for example irrigating community gardens, or discharge it to the sewer system where infrastructure and capacity is available.
- Keep to a minimum exposed surfaces within dirty areas, such as construction sites, maintenance areas and landfill sites, by e.g. careful design and revegetation, to reduce the volume of dirty runoff generated and to minimise the potential loss of 'clean' runoff from the catchment.
- Pollution control encompasses waste water management quantity and quality monitoring.

Objective 4: Limit erosion and the consequent degradation of soil and pollution of air and water.

- The Local Authority should rehabilitate all disturbed council owned land as soon as the disturbing force is removed e.g. after construction of infrastructure and completion of maintenance, following major rainfall events or pipe bursts.
- The Local Authority should ensure all privately owned land is rehabilitated as soon as the disturbing force is removed e.g. after construction of infrastructure.
- Water systems, such as stormwater drains and canals must be designed to prevent pollution and minimise erosion or sedimentation.

Objective 5: Prevent damage to groundwater from seepage arising from the Local Authority's activities.

- Design, operate, maintain and manage leachate detection and collection systems at landfill sites.
- Monitor pipe infrastructure for subsurface leakages.
- Minimise ponding of potentially contaminated water by appropriate design of infrastructure and cleaning up of spills as soon as possible.

Objective 6: Promote socio-economic development.

- Identify and assess labour intensive methods for project implementation.
- Identify creative means for community involvement in and remuneration for operation and maintenance of IWRM projects/activities. (This will provide communities with a sense of ownership and pride and hence ensure sustainability of projects).

Objective 7: Communication and engagement with stakeholders.

- Review the water management strategy with stakeholders and form partnerships with them in the implementation of this.

Objective 8: Monitor and assess compliance with this strategy.

- Regularly monitor potentially affected water resources to assess whether the Local Authority is having a negative impact on water resources.
- Report e.g. through the CMFs and DWAF, the assessment of monitoring results, any changes to the water management strategy and any significant incidents to stakeholders.
- Carry out regular internal reviews and audits to ensure the Local Authority is operating in accordance with the water management strategy and its environmental commitments with respect to the IDP, WSDP, IWMP and IWRMP.

3.5.2.6 Municipal functions that relate to IWRM

The Water Services Development Plan (WSDP) clearly sets out the business of water services delivery in 10 business areas. If a municipality successfully fulfils the tasks, migrating toward IWRM will only require some shift in approach through realigning operational areas and integrating management roles. Key areas in the WSDP for IWRM is the water balance, water conservation and demand management and well structured and implemented operation and management protocols. Realigning the operational areas of solid waste management with stormwater management may be the biggest challenge while incorporating water into planning is a small adjustment. The IDP already requires integrated planning so the bases for better integration is already there but the practice is still lacking. However, few municipalities, especially that are category B, can successfully and wholly execute all their mandated water service responsibilities.

As registered water users, municipalities have several other functions they are obliged to fulfil, a number of which fall in the ambit of successful IWRM. In terms of IWRM the duty of a municipality, besides services provision, is principally to manage possible sources of water pollution so that the water resource is protected (i.e. undertake source directed control as it relates to licenses and to authorised water use). If local government was to follow a step by step approach to engaging in IWRM the first step would be to ensure that mandated tasks are performed as well as possible.

There are two different aspects to the water functions performed at local government level – the first are functions that must be performed by municipalities under their responsibilities as a water user governed by the Water Services Act (e.g. control of effluent discharge from WWTW); the second are functions which municipalities should be performing as government authorities, amongst other things, through their own by-laws. There are, therefore, sections of the Water Act that by inference directly apply to local government.

Compliance rather than regulation is at the heart of the LG mandates as determined by the Water Act. However, the philosophy of the act implies sustainable management, conservation and protection of the resource while ensuring equal access to water. This should inform all decisions and actions that local government undertake as the WSA and/or WSP to the citizens in its jurisdiction. Compliance to source-directed controls is, therefore, a responsibility of a municipality.

In Chapter 3 of the NWRS (2004) source-directed controls are discussed in terms of their role as protective measures for water resources. Source-directed controls are now incorporated into conditions in water use licences and general authorisations. The conditions that may be imposed on water use are described in section 29 of the Act, and cover all aspects of all types of water use. They are closely associated with the resource quality objectives and are intended to ensure that the cumulative impact of water use, in respect of quantity and quality, does not exceed the limits appropriate to the class of the

resource. Source-directed controls for all water use will continue to be implemented as licences are issued, and will contribute to the achievement of the objectives for the protection and use of a resource in terms of its class.

The role of Local Government in contributing to and complying with source-directed controls is to ensure that waste water discharges and solid waste management do not adversely impact the water resource and that they comply with the conditions of their license as a water user.

Source-directed controls that may be applied to prevent or minimize pollution include recycling or re-use of waste, water recovery, detoxification, neutralization and treatment, and the introduction of cleaner technology and best management practices.

More emphasis on downstream water resource protection is an area desperately in need of municipal attention. Water resource protection within municipalities includes water conservation/water demand management (WC/DM), and water quality and quantity management monitoring. There is not a single "best" model or recipe for either water resources authorities, or local governments for WC/DM (Smits and Butterworth, 2006). However, municipalities have to ensure they:

- Reduce water wastage.
- Reduce unaccounted for water usage including loss from leakages, illegal connections, and poor billing & cost recovery.
- Delay costly water scheme upgrades.
- Reduce sewage treatment costs/ upgrades.

All four of the above points would be addressed in improved O&M protocols, and rehabilitation and improvement of infrastructure such as metres and monitoring systems.

The overall effectiveness of WRM at a small local government level relies on public participation (Mazibuko and Pegram, 2004). Unless the public comply and assist with patterns of behaviour facilitating resource management issues, the resource directed measures and source directed controls are likely to be relatively ineffective.

As water users municipalities have responsibilities which fall within the ambit of IWRM.
These include:

- Effective Operation & Maintenance of Waste Water Treatment Works (WWTW) and ensuring that they comply with license conditions for discharge e.g. for WWTW. Currently there are significant pollution problems arising from poor management of these facilities by municipalities. Improvement in this would considerably improve the quality of water resources, particularly in and immediately downstream of urban areas (Schreiner pers.comm, 2007).
- Effective Operation & Maintenance and refurbishment of infrastructure such as pipes, reservoirs, pumps and meters to minimize real losses. Currently the water loss in municipal areas is unacceptably high, and management of this problem would assist considerably in managing water scarcity (Schreiner pers.comm, 2007).
- Control of water weeds on municipal dams.
- Control of alien invasive plants on the commonage and municipal dams that impact on water use. Municipal by-laws can be used for this purpose. Examples have already been established on how this can work (Schreiner pers comm. 2007).

- The formulation of bylaws and regulations to facilitate the management of water, waste and related functions (Schreiner pers.comm., 2007).

3.5.2.7 Links between Water Resource Management and Water Service Delivery

The table below provides an overview of the links to and impacts that water service delivery functions have on water resources.

Table 3.2. Links to and impacts that WSD functions have on WRM. Column 1 details the information that is required to fulfil the tasks successfully. Column 2 details the links between the water service delivery tasks and the water resources management tasks as set out in the Water Act and its regulations as developed by the DWAF. Column 3 details the impacts that WSD tasks have on the water resource which local government may not be aware of.

INFORMATION NEEDED	WSD FUNCTION AND LINKS TO WRM	IMPACT ON WATER RESOURCE
Water resources planning		
Links to DWAF policy and regulation		
To be found in the WSDP (sections 5.1.2)	Correct development of the WSDP	Flow reduction and alteration through abstraction, damming and inter basin transfer schemes. General reduction in water quality in receiving waters.
Bulk water management; assurance of supply		
Links to DWAF RDM directorate, planning and allocation, CMAs		
Demand Quantity (annual)	Links to planning on the scale of the WMA	The quantity of water demanded will impact upstream riverine ecosystems through inter-basin transfers and dam construction
Quality	Determine the treatment required for purification	No direct impact
Potable water management		
Links to DWAF drinking water quality regulations, WCDM plans		
Quantity required	Distribution infrastructure, metering Water loss directly linked to O&M	Poor payment = poor maintenance = increased demand both in quantity and infrastructure
Sanitation and waste water management		
	Links to DWAF licensing conditions and WSDP	
Quantity	Metering, infrastructure and O&M as well as water balance under WCDMP	Increase in discharge and seasonality of receiving water.
Quality	Monitoring of effluent discharge and supply of information to CMA & the DWAF (NWA S26) (S56(5))	Water quality deterioration of both surface and ground water.

Types of sanitation solutions	Links to environmental and public health and disease control.	Deterioration of environmental health
Stormwater management		
Quantity (rainfall periodicity and volume) and extent of hardened surfaces	Correct design of infrastructure for calculated discharge volumes.	Water quality deterioration, erosion and change in size of channels due to concentration of flow along natural flow paths
Topography	Flow patterns and flood lines and their links to town planning decision making.	

3.5.2.8 IWRM functions that could be performed effectively by local government

More work needs to be done to consider whether there are currently IWRM functions that fall outside the Constitutional responsibility of local government that should be assigned to them. In the context of the challenges facing local government and the poor record of service delivery in a large number of municipalities, the issue of capacity to implement further functions should be considered. Nonetheless, there are some functions not covered by Schedule 4/5 Part B where municipalities could play a useful role with regards to IWRM:

- Communication of dam safety issues to local communities and educational awareness campaigns in this respect.
- Planning for multiple use systems – this will require the municipality to interact with a number of other government stakeholders to ensure an integrated planning process to provide water that meets not only the domestic but also the developmental needs of communities, particularly peri-urban and rural communities.
- Monitoring of water quality and quantity within their area of jurisdiction. Where municipalities have their own dams, or groundwater reserves on which they are dependent, they will need to monitor water levels and water quality. This information, with the appropriate quality controls, could form a useful part of a national monitoring network.
- Working with WUAs to ensure alignment between the WUA plans and approaches and local economic development issues. Being present and on the ground, municipalities could also play a role in ensuring the transformation of WUAs and the contribution to local development.
- A general environmental management plan is also important, especially as it directs the management and care of rivers and wetlands.

Box 1. Constitutional mandates for Local Government.

The functions of local government are defined by the Constitution of South Africa (Act 108 of 1996) which states that:

152 (1) The objects of local government are –

a) To provide democratic and accountable government for local communities;

b) To ensure the provision of services to communities in a sustainable manner;

c) To promote social and economic development;

d) To promote a safe and healthy environment;

e) To encourage the involvement of communities and community organizations in the matters of local government.

153 A municipality must –

a) Structure and manage its administration and budgeting and planning processes to give priority to the basic needs of the community, and to promote the social and economic development of the community;

b) Participate in national and provincial development programmes.

156 (1) A municipality has executive authority in respect of, and has the right to administer:

a) The local government matters listed in Part B of Schedule 4 and Part B of Schedule 5;

b) Any other matter assigned to it by national or provincial legislation.

(2) A municipality may make and administer by-laws for the effective administration of the matter which it has the right to administer.

(4) The national government and provincial government must assign to a municipality, by agreement and subject to any conditions, the administration of a matter listed in Part A of Schedule 4 or Part A of Schedule 5 which necessarily relates to local government, if –

a) That matter would most effectively be administered locally; and

b) The municipality has the capacity to administer it.

Arising from s156, it is clear that municipalities have executive authority w.r.t the following matters from Schedule 4 and 5 part B, as they impact on IWRM:

- municipal planning,
- stormwater management systems in built-up areas,
- water and sanitation services limited to potable water supply systems and domestic waste-water and sewage disposal systems,
- local sport facilities,
- refuse removal, refuse dumps and solid waste disposal.

These are functions that local authorities must perform according to the Constitution. Other functions can be assigned to them by national government if they will be most appropriately performed at local level and if the municipality has the capacity to perform these functions. The task is to examine what IWRM functions, if any, should be assigned to municipalities over and above their constitutionally determined functions.

Box 2. Local government mandates with regards to Water Services Delivery

Water Services Act 108 1997 (shortened somewhat)

In terms of the Act many municipalities are WSA or WSP. A core function of local government and one of its main revenue streams is the provision of water services namely potable water provision and wastewater treatment. In this report, only the roles of WSA are discussed and in particular Chapter 3 section 13 (a-i) that deals with WSDPs.

The Water Services Act 108 of 1997 was promulgated among other things:

- to provide for the rights of access to basic water supply and basic sanitation;
- to provide for the setting of national standards and of norms and standards for tariffs;
- to provide for WSDPs;
- to provide a regulatory framework for water services institutions and water services intermediaries;
- to provide for the monitoring of water services and intervention by the Minister or by the relevant Province;
- to provide financial assistance to water services institutions;
- to provide for the gathering of information in a national information system and the distribution of that information;

Chapter 3 deals with Water Services Authorities

11. Duty to provide access to water services

12. Duty to prepare draft Water Services Development Plans

13. Contents of draft water services development plan: Every draft WSDP must contain details -

(a-d) of the physical attributes of the area; the size and distribution of the population within that area; a time frame for the plan including the implementation programme for the following five years and; details of existing water services;

(e-f) of existing industrial water use within the area of jurisdiction and existing industrial effluent disposed of within the area of the WSA;

(g) of the number and location of persons within the area who are not being provided with a basic water supply and basic sanitation;

(h) regarding the future provision of water services and water for industrial use and the future disposal of industrial effluent including -

(i-iii) the WSPs which will provide those water services; contracts and proposed contracts with WSP; the proposed infrastructure necessary;

(iv) the water sources to be used and the quantity of water to be obtained from and discharged into each source;

(v) the estimated capital and operating costs of those water services and the financial arrangements for funding those water services, including the tariff structures;

(vi) any water service institution that will assist the WSA;

(vii) the operation, maintenance, repair and replacement of existing and future infrastructure;

(i) of the number and location of persons to whom water services cannot be provided within the next five years setting out -

(I-ii) the reasons therefore and the timeframe within which it may reasonably be expected that a basic water supply and basic sanitation will be provided to those persons; and of existing and proposed water conservation, recycling and environmental protection measures.

14.-18. Drafting, adoption, reviewing and implementing reporting of the WSDP

19. Contracts and joint ventures with water service providers

20. Water services authority acting as a water services provider

21. Bylaws

Box 3. Municipal Legislation and IWRM

Chapter 5 of the M. Systems Act deals with Integrated Development Plans (IDPs) and their preparatory process.

Chapter 4 of the M. Finance Management Act deals with budgets and their preparatory process.

The IDP and the budget must be consistent with each other, which requires integration in planning, the basis of IWRM

BUT

Often the IDP is in the correct format but the information included is not correctly assembled or faulty, for instance, very few municipalities have prepared accurate water balance calculations or waste water discharge volumes.

3.5.3 Integrated Water Resources Management Plan Guidelines

As defined by the Integrated Water Resource Management Plan (IWRMP) Guidelines (Burke, 2007) an IWRMP is a plan aimed at dealing with the socio-economic, technical, financial, institutional, political and environmental issues as they pertain to management of the water resource at a local level (Burke 2007: 10). The plan also serves as a framework to ensure efficient, appropriate, affordable, economical and sustainable use and development of water resources by local government and includes the management of wastes that have the potential to impact on the water resource.

While the IWRMP encapsulates the strategic objectives and related roles and responsibilities directed towards sustainable (social, economic and environmental) development, Burke (2007) observes that IWRM is likely to retain its low profile among municipal managers and officials until such time as it is a funded municipal mandate, which will require a change in legislation. DWAF, DPLG and SALGA are identified to drive the necessary legislative changes and to further support local government in developing appropriate by-laws to promote the incorporation of IWRM principles across the various sectors within the municipality. As noted earlier, a further key limitation to IWRM planning and implementation is the municipal strategic planning process, as currently practiced. Burke (2007) indicates that unless a change in mindset is achieved, the IDP will always place emphasis on development at the expense of the environment since the IDP is driven by the political process rather than a focus on environmental protection.

The IWRMP Guidelines (Burke, 2007), which were developed principally to assist municipalities in rising to this challenge, highlight the need for cooperative governance together with cooperation between government and the private sector in realising sustainable development. The Guidelines are further targeted at assisting municipalities in responding to the challenges of establishing funding sources, building local government capacity, clarifying the roles and responsibilities of all sectors involved in IWRM and aligning the various processes underway at national, provincial and local levels in the service delivery and resource protection sectors. The IWRMP will provide municipalities with the supporting technical documentation for water use licence applications and will enable alignment with the catchment vision and the water management functions of the WMA's Catchment Management Strategy (CMS). Where a CMS has not yet been developed, the IWRMP is envisaged to provide valuable input into the development (Burke, 2007).

CHAPTER FOUR

4. CASE STUDY OF MAKANA MUNICIPALITY AS A WATER SERVICES AUTHORITY AND WATER SERVICES PROVIDER by Fox, Haigh & Davies Coleman

4.1 Municipal Institutional and Water Resources Management context

4.1.1 Location and Institutional Context

Makana Municipality is one of nine local municipalities of Cacadu District municipality which falls within the Great Fish River Catchment of Water Management Area (WMA) 15: Fish to Tsitsikamma, one of the largest of the country's nineteen WMAs in terms of geographic size. WMA 15 has the seventh largest population and the seventh highest gross regional product (GRP) of all WMAs, along with the eighth highest mean annual runoff but the fifth highest water requirement (NWRS 2001, DWAF, 2005).

Within WMA 15: Fish to Tsitsikamma, the Makana Local Municipality falls into two management sub-areas, namely the Fish and Albany Coast. The sub-areas are constituted of grouped quaternary catchments that have been demarcated in accordance with the NWRS[4]. All three of the Makana urban settlements fall into the Albany Coast management area, while the north-eastern portion of the municipality falls into the Fish Water Management Area (Figure 3.1 &3.2).

The Cacadu District Municipality (CDM) is constituted of four departments – Infrastructure Services; Finance and Administration; Economic Development; and Community Services – under the Office of the Municipal Manager, the Executive Mayor and mayoral committee, and the District Council. The CDM has substantially reduced in size and has undergone some institutional restructuring to accommodate the loss of approximately 93% rates income and the decreased staff complement, from around 250 to 58 officials, since April 2003 and the exclusion of the Metro from its area of jurisdiction. The Infrastructure Services department incorporates the Water Services Authority (WSA) branch, which is currently staffed by only one official, (Mr Snyman a WSA Engineer), with two technician posts planned to be filled. Other Infrastructure Service branches fall into two broad functions: planning – including Infrastructure Planning and Regional Planning; and support to local municipalities – including the WSA and Project Management branches. Cacadu is unique within the Eastern Cape as the only district with all local municipalities authorised as WSAs. All local municipalities in the Province, excepting Buffalo City and the Metro, rely on their respective district municipalities as WSAs.

[4] The Fish sub-area corresponds with the catchment of the Fish River (Drainage Region Q), has 71 quaternary catchments and predominantly extends into the arid Great Karoo. The Albany Coast sub-area is comprised of the coastal catchments between the Fish and Sundays rivers (Drainage Region P), has 16 quaternary catchments and is characterised by steep, bush covered hills with deeply incised river valleys. (DWAF 2005)

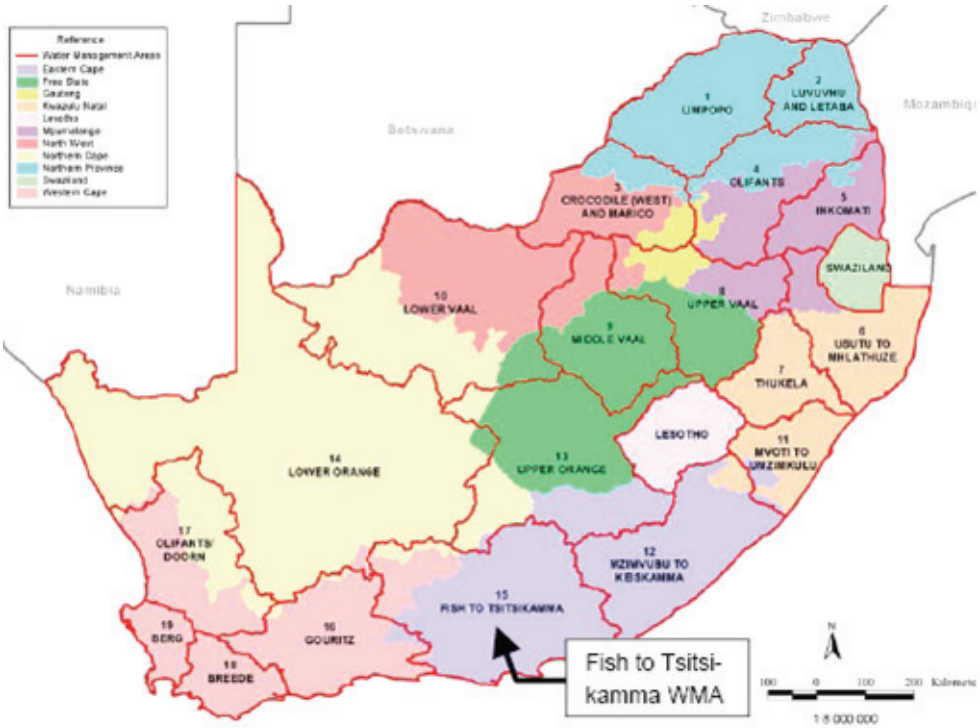

Figure 4.1 Location of the Fish to Tsitsikamma WMA 15 in South Africa.

4.1.2 General description of Makana Municipality

The Makana local municipality includes the urban settlements of Grahamstown, Alicedale and Riebeeck East together with the rural areas of Sidbury, Highlands, Carlisle Bridge, Frasers Camp, Manley Flats, Salem, Fort Brown, Seven Fountains and Committee's Drift. Grahamstown is the largest urban centre in the municipality, with population estimates that range between 90 000 to 120 000, with a substantial transient population of students at Rhodes University (6200 and increasing) and scholars at several large boarding schools.

The municipal area extends over 4,222 km^2, occupying only 7.25% of the Cacadu District area, while the local population was approaching 85,000 in 2004 (Global Insight, 2005) representing over one fifth (20.97%) of the total Cacadu population. The local municipality is the most highly urbanised (82.94%) local municipality in the District and has a relatively high population density of around 20 people per squared kilometre.

4.1.3 Environmental Context

The Cacadu District is a richly diverse environment, including six of the seven national biomes (forest, grassland, succulent Karoo, fynbos, savannah grasslands and thicket) within its boundaries. Cacadu is also the only district in the Eastern Cape to fall into three environmental planning domains, namely the bioregional conservation programmes of STEP (Subtropical Thicket Ecosystem Plan), SKEP (Succulent Karoo Ecosystem Plan) and CAPE (Cape Action Plan for the Environment). Makana district is predominantly rural in character and the economy is based on agriculture and conservation (a wide range of game can be found in the many varied biomes) (Makana IDP, 2007). Makana falls within the Eastern Cape's tourist region of "Frontier Country", the scene of nine 19th century British-Xhosa Frontier Wars which is now developing into the Province's Wild Life Game Reserve Route which, being malaria free, has tremendous tourism potential. There are several major private game farms

(Lalibela, Kwandwe, Shamwari and Amakhala), many smaller enterprises as well as the public game reserves of the Great Fish River Reserve and smaller Ecca, Blaauwkranz and Thomas Baines nature reserves. The total conserved area in Makana amounts to approximately 56,970 ha (13.49%) (Makana LEAP, 2004).

The geology of the area is complex with intercalation of sandstones and alluvial coastal shales and large deposits of fine kaolin clays. The soils are similarly a complex mixture with a predominance of soils with high clay content. The Makana topography is characterized by fairly substantial rolling hills and valleys, falling generally from north to south. The climate is semi-arid and has a bimodal rainfall pattern with an average rainfall of between 250 and 500 mm spread throughout the year.

The Makana IDP is misleading in its portrayal of the Municipality as an area which is not under environmental threat when it states that Makana is principally classified as 'STEP Corridor' and 'Least Threatened'. Exploring the 'STEP Handbook' and related 'Mapbook' (Pierce, 2003), the Makana municipal area includes small pockets of 'critically endangered' (highest priority) areas, more substantial pockets of 'endangered' and stretches of 'vulnerable' areas. 'Impacted' areas are spread throughout the Municipality, associated principally with 'vulnerable' areas and with urban and rural settlements, pockets of 'process' (highest priority) areas and expansive bands of 'network' (high priority) areas occur predominantly alongside river systems, particularly to the north and east of Grahamstown.

Major threats to biodiversity in Makana include loss of habitat through urbanisation, deforestation, soil erosion and land degradation, cultivation, overgrazing, unsustainable veld management, overexploitation of wetlands, unregulated harvesting of medicinal and indigenous plants, invasion by alien plant species, encroachment of woody shrubs, unregulated development of private game reserves and poor to absent management of existing nature reserves. Makana contains a significant portion of the Succulent Thicket and the extent of degradation due to overgrazing by domestic herbivores is a significant threat to biodiversity. The degree of transformation of the STEP area of Makana is calculated at 4.83% by agricultural cultivation, at 1.42% by urbanization and at 0.80% by alien plants and commercial plantations. There is an evident need to monitor and limit threats to biodiversity (Makana LEAP, 2004).

4.1.4 Water resources of the district

The area is traversed by some six perennial rivers and related tributaries, including: the Bushman's, running south from Alicedale and progressing along the south-western and southern boundaries; the New Year's, between Alicedale and Grahamstown; the Koonap, running along the north-eastern boundary and the Great Fish, running through the Municipality from the west to proceed along the north-eastern and eastern boundaries, together with the associated Botha's/Kap and Brak tributaries; the Kowie and associated Bloukrans, both running south downstream of Grahamstown; the Kariega and associated Berg and Palmiet, running between Alicedale and Grahamstown to the south-east (Makana WSDP, 2007; Gambiza & Palmer, 2004). The town is at the headwaters of the Kowie River, which flows to Port Alfred a coastal tourist town. Many streams have been channelised to improve the stormwater management, avoid flooding of the low lying parts of town and avoid pooling and stagnation of the polluted runoff. In some parts of town these canals often run with sullage and very often, sewage water. At least 15 confirmed wetlands are found within Makana district. Most of the wetlands in the area are dolines or pond wetlands.

The water supply dams include the Jameson and Milner (Slaaikraal Valley, completed 1905-8), Howison's Poort (completed 1941) within the Thomas Baines Nature Reserve, New Year's (Alicedale water), Settler's (completed 1962), and Glen Melville (with associated Ecca Canal and Glen Boyd Balancing Dam, (completed in 1994). There are also several smaller older dams close to town.

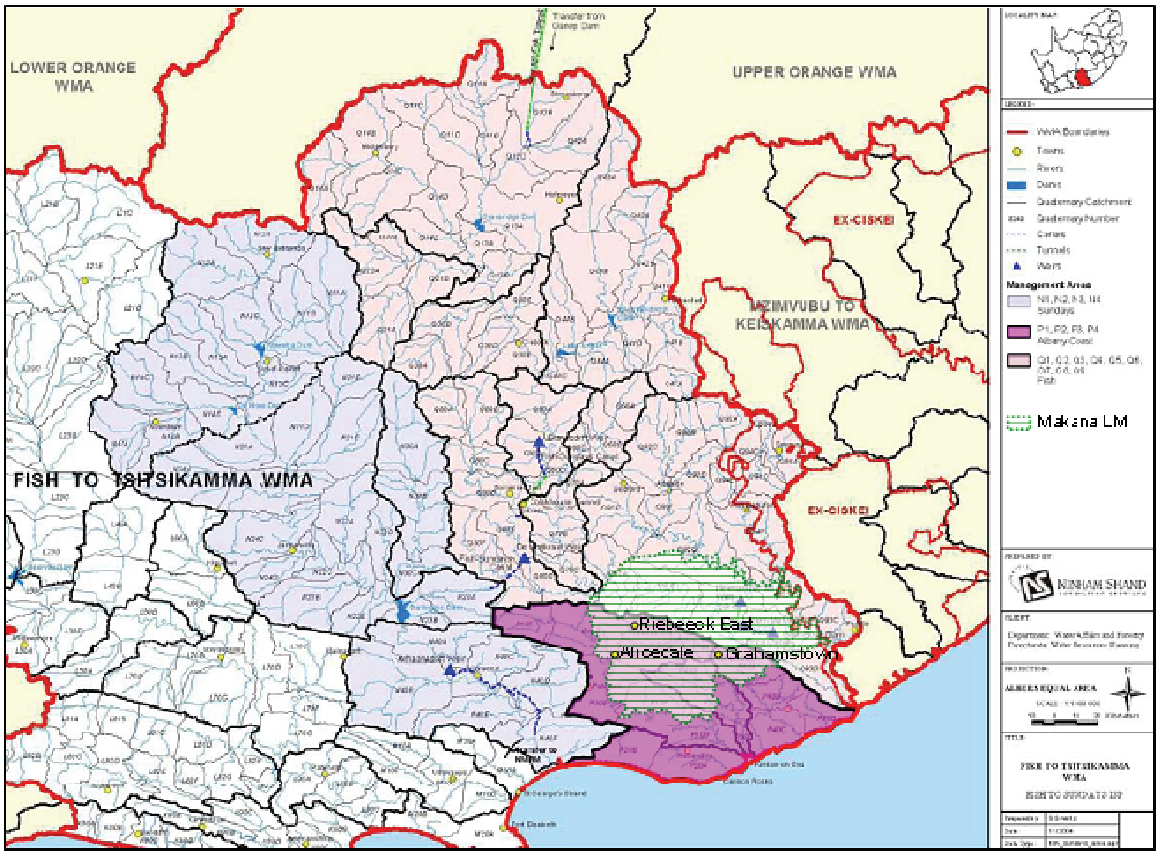

Figure 4.2 Situation of Makana Local Municipality in the Fish to Sundays Management Areas.

4.1.5 Institutional Context

As a category B municipality Makana is a service provider in a range of services including water services (as it is both a WSA and WSP) and the related administration and staff functions. The main objective of a service provider should be the promotion of an environment conducive to the development of the municipal citizenry (Makana, 2004). The powers and functions allocated to the Cacadu District and Makana Local Municipalities, as determined by the Eastern Cape MEC for Housing Local Government and Traditional Affairs is tabulated below (Table 4.1).

Table 4.1 Powers and Functions allocated to Cacadu and Makana municipalities

POWERS AND FUNCTIONS	Cacadu	Makana
Air pollution		Yes
Building regulations	Yes	Yes
Child care faculties		Yes
Electricity reticulation	No	Yes
Fire fighting	Yes, only for EC106	Yes, incl. DM function
Local tourism	Yes	Yes
Municipal airports	Yes, excl. EC101,EC108	Yes

Municipal planning	Yes, for EC103 and IDPs	Yes
Municipal health services	Performs its own function	No
Municipal public transport	Yes	Yes
Pontoons and ferries	NA	Yes
Storm water		Yes
Trading regulations		Yes
Water (Potable)	Yes	Yes
Sanitation	Yes	Yes
Beaches and amusement facilities		Yes
Billboards and advertisements in public places		Yes
Cemeteries, funeral parlours and crematoria	Yes	Yes
Cleansing		Yes
Control of public nuisance		Yes
Control of undertakings that sell liquor to public		Yes
Facilities for animal accommodation, care & burial		Yes
Fencing and fences		Yes
Licensing of dogs		Yes
Licensing and control of undertakings that sell food		Yes
Local amenities		Yes
Local sport facilities		Yes
Markets	Yes	Yes
Municipal abattoirs	Yes	Yes
Municipal parks and recreation		Yes
Municipal roads	Yes	Yes
Noise pollution	Yes, for four LMs	Yes
Pounds		Yes
Public places		Yes
Refuse removal, refuse dumps, solid waste disposal	Yes	Yes
Street trading		Yes
Street lighting		Yes
Traffic and parking		Yes

Source: Cacadu IDP (2007)

The Makana Municipal Manager heads four directorates, as well as a Local Economic Development Unit (which is in the process of becoming a directorate) and the Special Programmes Unit. These are: Infrastructure and Technical Services; Finance Services; Corporate Services; and Community and Social Services. The Municipality, which is headed by an Executive Mayor, extends over 12 wards, each with a ward councillor reporting to the Speaker, and has a further 12 proportional representation councillors. Six portfolio committees report to the mayor, namely: Finance and Service Delivery; Social Services and Community Empowerment; Land, Housing and Infrastructural Development; Economic Development and Tourism; Environment, Disaster Management and Heritage; and Corporate Services (Makana, 2004).

The staff establishment for the Municipality is reflected at 594 officials, with salaries accounting for around 41% of the total municipal budget (Cacadu IDP, 2007). While political differences and pressure have reportedly led to several resignations, the acting assistant Director of Technical Services and IDP Manager concur that posts are being filled at a comparable rate. One respondent noted that Makana

does appear to have sufficient technical skills in filled posts, but questioned whether appropriate and adequate capacity and expertise was in place. The latter concern is echoed in the Makana WSDP (2007), which highlights lack of human resource capacity, together with lack of financial resources and inadequate office accommodation as problems being experienced by the Local Municipality.

Makana Local Municipality does not have sufficient technical managerial skills and strategic planning capacity. There are few remaining experienced staff to ensure institutional 'memory' and enable transfer of experience. In addition, current staff do not have the technical skills to collect and analyze relevant information to complete management and development plans without outside assistance. Mr. Dredge (pers.comm, 2007) stated that municipal management needs a complete overhaul as there is no management understanding or experience, quality has dropped and financing for operations is insufficient. The number of municipal vacancies reported in *Grocott's Mail* (8 January 2008) suggests that the situation is rather grim, with vacancies in the services departments amounting to 36 in the Water and Sewerage section, 14 in Roads and Maintenance and 10 in Electricity. The Cleansing Department has a limited number of staff presently employed to cope with the volumes of solid waste generated in the streets by the community.

4.1.6 By-laws and Strategic Plans

The Makana Municipality lacks a number of required policies and programmes relating to performance management and the institutional framework, including: Performance Management; Contracts; Work Skills Plan; Placement Policy; and the Affirmative Action Plan (Makana WSDP, 2007). Job evaluation has reportedly been undertaken for 68% of positions, compared to 98% for the CDM. Makana is presently not compliant with municipal financial (MFMA) and accounting (GAMAP/GRAP) requirements and has not developed an asset register, but has made progress in respect of developing by-laws, having project management and audit committee capacity, undertaking internal auditing, having an Indigent Policy and providing free basic services (6 kilolitres water, 50 kilowatts electricity) (CDM IDP, 2007).

4.1.7 Financial situation

Payment for services (throughout the town) is at 45%, meaning payment in Rini, the former township region of Grahamstown, is likely to be less than 20%. Alicedale, the second largest town in Makana Municipality, has been in an economic slump for a number of years since it ceased to be a main railway junction and the station became defunct. Recent game reserve development in the area and interest in economic development of the town has seen many jobs created, new buildings, and a new (water drawing) golf course with an attached new housing estate. Riebeeck East serves mainly as a social centre and has little financial activity except for a small shop and a church.

4.1.8 Institutional assessment

The main municipal institutional issue affecting the management of water in Makana is the lack of integration within the municipality between planning, management and function. Services that could impact on water resources are located in different directorates. Water provision and sanitation management and stormwater management are located in the Infrastructure and Technical Services department; waste management in Community and Social Services while there is no dedicated planning unit. IDP falls under special projects or local economic development. The management systems resemble a row of silos or functional fortresses (Dent, 2007) where there is no co-ordination between departments/ directorates. For example, waste management does not attend water meetings; finance does not attend water infrastructure meetings; senior managers never have planning meetings; and the

municipal manager seldom communicates with directors. The previous Director of Finances (Mr. Dredge pers.comm., 2007), explained that there are no meetings between directors and officials don't listen to each other. Instead they set their own targets disregarding other sectors. Similarly performance targets are not integrated, are often linked to political promises and set for specific departments: The aim is to meet targets (often project based) rather than work in the interests of sustainability. Mr. Dredge also described how planning procedures are not adequate and that planning and project registration for the IDP is often not integrated or based on reality – they are rather wish lists. Better integration at the planning stage would thus circumvent many problems experienced in municipal development. Related to this, there is a lack of in-depth analysis of the sustainability of new projects. This requires a thorough analysis of available staff/skills, and financial and O&M requirements of a new project to know if it is viable for an extended period. This in turn requires integrated planning and management.

Generally the relevant officials provide the councillors with the technical information they require but the councillors have no way to assess the accuracy or veracity of the information unless they have some training. If, however, the councillors do not agree or do not want to accept the officials' recommendation it is either shelved or deferred. Trust between municipal officials and councillors is not really there and the objectives of councillors and officials differ. For example, councillors have a short term view with a focus on infrastructure and services without considering sustainability and operation and maintenance.

Problems raised by councillors include:

- Failure of some officials to reply to correspondence and one being accused of not understanding procedure.
- Lack of respect shown for the agreed budgetary constraints by top management especially by the mayor and municipal manager who over-spend on non essentials like conferences.
- Time wasted on the late arrival of the mayor and other senior councillors.
- Timing and scheduling of meetings and cryptic notes.
- The closed mayoral executive where the portfolio minutes go to the mayoral executive committee which is closed and councillors do not see the minutes again for about 2-3 months by which stage one has almost forgotten what has been decided.

4.1.9 Data Management

Research indicates that Makana municipality battle with data management. Project researchers have found it difficult to obtain accurate water related information from the municipality while an expert in water information, Professor Hughes (pers.comm., 2007), confirmed that municipal data was very inaccurate and although municipal billing may be up to date, in some areas water meters had not been read in years. Municipalities consequently did not have proper water consumption records on which to base any projected water-use planning. It was also noted that no accurate records of water balance were available. In addition, physico-chemical data, to assess water quality, are presently kept in many places and it is difficult to access and integrate for use in planning and management. Data from the SASS or mini-SASS (school learners or members of the public) must be sent to the Makana Environmental Health Officer, who will collate these and send them onto DWAF offices in East London for data capture and assessment. There is also a lack of correct data collection and analysis:

- Electronic data collection is stored in PDF format rather than .xls format so it cannot be analysed;

- Data collection of monitoring is in hard copy only which prevents the easy sharing of information;
- There is no in-house GIS manager or system so the municipality is heavily reliant on consultants.

Exemplifying the capacity (human and financial) problems presently being experienced by Makana, recent (November 2006 – February 2007) water and electricity cuts in Grahamstown meant that some people went for a week or more without services, on a regular basis. Details are recorded in an article to the local newspaper, written by a local councillor motivated to write because of the complete lack of communication from the previous Municipal Manager. The problems exemplified:

- A pattern of non-payment of accounts leading to financial constraints on Operations and Management with consequent deterioration of the water pumping and reticulation system;
- A massive increase in human resources budget of the new Municipal Manager, Directors and councillors packages;
- A lack of professional skills in the municipal system combined with a rapid turnover of staff meaning little municipal memory.

4.2 Management of Water Services Delivery affecting water resources

4.2.1 Water Services institutional arrangements

4.2.1.1 Limited Capacity

A general problem in South Africa is a shortage of adequately trained staff with correct qualifications and skills of a technical/engineering type to manage infrastructure and technical services. WSD is a highly technical task requiring specific scientific skills. At municipal levels these skills have been lost in the transition and generally not adequately replaced.

Findings from a South African Institute Civil Engineers' report on capacity in local government (2005) revealed the following governance capacity issues:

- 70 of 231 local municipalities have no civil engineers or technicians;

4 of the 47 DMs have no civil engineers or technicians;
45 LMs have only one civil engineer;
4 DMs have only one civil technician (Schreiner pers comm.).

Table 4.2 Staffing levels in local Municipalities (WSD), in each of the nine provinces, in 2005, from the SAICE report.

Number of LMs in each province who are WSAs	10	20	9	3	17	9	27	7	24
Number with adequate water staff	3	6	3	1	4	1	13	2	15
Number with adequate sanitation staff	5	5	2	1	5	1	11	0	13

A status quo analysis has been undertaken of Makana Local Municipality and its internal capacity problems in addressing the full range of water services, environmental health services, water resource management, and solid waste management.

Table 4.3 Staff complement in water service units of Makana Municipality 2005	
Staff complement	**TOTAL**
No. of approved posts	25
No. of filled posts	76
No. of vacant posts	35
No. of permanent staff	9
No of S57 employees	Not available
No. of casual staff	1
Allocation per performance area	
Management	9
Water Treatment Plant	1
Sewerage treatment works	9
Water reticulation	9
Conservancy tank clearance	6
Night soil clearance	9
Sewerage system	2
No. of temporary staff	?
No. of secondments/ transfers from DWAF	?

A skills assessment of the water services section was conducted for Makana Municipality in 2005 by a consultant. It was not completed by senior staff so the skills gaps in decision making and planning ranks is not immediately clear. There are also many gaps among senior operational ranks see (Table 4.1 & Table 4.2.).

Table 4.4 Skills audit conducted in 2005 among 43 water sector employees in the service of Makana Category B municipality from mainly operational staff. Replies were not received from respondents in administration, management or professionals. Many of the recorded skills shortages are due to unfilled posts. The bold words indicate skills that are available, if in limited numbers.

Key performance area **Skills not recorded or lacking**	**Key performance areas** **Limited skills**	**Water Services infrastructure Construction** **Available skills**	**Water Services infrastructure Construction** **Skills shortage**
Water Resource Assessment	Water services infrastructure construction	**Coordinate and oversee the construction of dams, reservoirs & tanks**	Construct waste water treatment plants
Water service needs analysis	Water conservation Community awareness & education	Drill boreholes	Construct water sewerage works
Water Supply Planning	Bulk water distribution & reticulation	**Construction of water treatment plants**	Lead and supervise construction teams
Research	Resource Management &	Lay pipes for water reticulation system	Coordinate and monitor water services

	Maintenance		infrastructure construction
Admin support services	Bulk Water Treatment	**Implement the planned exaction and piping related to bulk water supply**	
Laboratory	Water consumption management	Install and maintain plumbing systems	
	Waste water sanitation & conveyance; Waste Water Treatment	Install community taps	
	Solid waste sanitation	Install and maintain water and sewage connections to premises	

The newly appointed director of the Department of Infrastructure and Technical Services has moved from the Chris Hani District Municipality after the sudden departure of the previous incumbent found the lack of technical assistance in Makana combined with the expected outcomes of his department too much to cope with, and returned to his former post in Ndlambe Municipality. Makana Municipality is no different to the general South African situation in small municipalities, lacking experienced staff who reside in the area for a considerable time so that the Makana institutional 'memory' is on a continuum. The new director of Community and Social Services did not enjoy a hand over period and never even had the opportunity to meet his predecessor to learn from him.

Table 4.5 Functions performed by the municipal staff and those outsourced.

Performed in-house	**Outsourced**
Water supply/planning	Research
Bulk water treatment	Planning & Designs
Bulk water distribution & reticulation	Construction
Water consumption management	Training
Waste water treatment	
Waste water sanitation & conveyance	

Another staffing issue is that of shared functions, where municipal staff responsible for water and sanitation functions are also responsible for performing all other services, such as roads and stormwater, in a context where management and resources (financial and human) are nearing the limit within the current water and sanitation networks (Makana WSDP, 2007). The latter consideration is particularly problematic considering that Makana targets levels of service that are higher than the national RDP minimum standards (i.e. waterborne sanitation and individually metered erf water connections), which means that additional resources will certainly be required as the water and sanitation networks are expanded. Moreover, Makana has limited record-keeping of operational functions and does not have the staff, equipment, financial resources or framework – such as a WC/WDM strategy, quality control plan or maintenance plan – to undertake condition monitoring and planned maintenance of existing assets or infrastructure (including meters and piping) (Makana WSDP, 2007). In short, Makana faces significant challenges in seeking to fulfil its WSA/WSP responsibilities effectively and efficiently.

The project team introduced the Makana Municipal engineering section to the idea of WRM and whose responsibility it lay with overall. Their reply was completely in the negative. They expressed no interest

and no motivation in preserving and protecting the water resources. It was conceived as 'not their job', possibly the environmental officers', and definitely DWAF's problem. Other engineers spoken to support this notion of responsibility – once compliant effluents leave a STW, it was the responsibility of DWAF. This low understanding of the connection between water resources and water services (piped water and sanitation) makes it difficult for the municipality to function as efficiently as they could, and to communicate effectively with stakeholders. The question that needs asking is: how effective have DWAF been to convince engineers and others country wide that there is indeed a directive that municipalities have responsibilities in WRM? Perhaps with the development of CMAs this sense of 'not us' will change. This does not mean their capacity to complete WRM will be any closer.

Interviews with key informants indicated that few municipal officials were familiar with the legislative framework they needed to apply in their operations, e.g. the Water Services Act. This is in spite of the fact that training on these regulatory frameworks should be mandatory (Ms Karar pers.com, Minutes Nov 2007). Related to training, councillor's response to a questionnaire indicated that most training is below standard, infrequent and usually in service.

4.2.1.2 Water Services Infrastructure

A recently compiled document on the history of Grahamstown's water by Mullins (2008) indicates that throughout Grahamstown's history there has always been a struggle to obtain a sufficient and reliable water supply that matched the growing population. There were regular water restrictions and drought would have a strongly negative effect on Grahamstown's water. Two interventions in the early 1980's have ensured that the municipality can now supply water to all residents. The wall at Settlers Dam was increased by 2.3m in 1981. The Gariep dam was completed in 1971 and water from the Orange-Fish inter-transfer- basin scheme reached Grahamstown after the completion of the Glen Melville dam with a capacity of 6 Megalitres supplied by 10x12 m^3/sec slugs of water during the year, in early 1992. Enormous advances in water service provision have been made in the last 10 years. In 2006 the majority of households (76.5%) had on-site access to water. The remaining local households were served by community stands (16.5%), borehole / tank (2.5%), water vendor / other (2.9%) or by natural water / dam (1.6%). However, housing shortages and insufficient sanitation provision are problems still to be tackled.

4.2.1.3 Water supply systems

Grahamstown has two water purification treatment works: Waainek and James Kleynhans. Waainek is supplied from Slaaikraal, Howisons Poort and Settler's Dam from where water is pumped into two reservoirs. It is gravity fed to the treatment works, the flocculent, aluminium sulphate ($AlSO_4$) is added, the water is settled, filtered and chlorinated and is then gravity fed to four reservoirs that supply parts of Grahamstown (Muller and Burgess, 2007). Being natural water, it is generally low in TDS and slightly acidic (good quality and taste) although it can vary depending on the levels of the supply dams. The infrastructure is old and the pumps are fragile causing significant interruptions to Grahamstown's water supply as they have to be sent to Johannesburg for repair at a vast cost (Muller and Burgess, 2007).

4.2.1.4 Management issues

There are issues of management. Although the Water Treatment Works manager has been there for eight years he has received no formal training and relies on past employees diaries to solve problems. There is also a shortage of staff with a lack of training (Muller and Burgess, 2007). The supply dams and reservoirs' water quality are not routinely monitored and there is no water quality control or structured cleaning. Water is only monitored at the treatment works and as the potable water leaves.

James Kleynhans treatment works receives water from Glen Melville (an off-river storage dam run by DWAF) at the request of staff at the Water Treatment Works (Muller and Burgess, 2007). This raw water, which is turbid and has high algal counts, is pre-chlorinated and flocculated with "Ferrifloc", allowed to settle, then sand filtered, chlorinated and pumped to Grahamstown. The pumps are quite new and their numbers were increased in about 2002. The quality of water leaving these purification work is quite different from Waainek water. It has higher concentrations of chemical salts, is harder and tastes different. This discernable difference in taste has caused much of the perceived 'problems' with Grahamstown water. (See Box 1 on drinking water quality)

Water in Alicedale is sourced from the New Years Dam, fed from the New Years River, a tributary of the Bushmans River and put through a sand filtration system before distribution. Riebeeck East water supply is from boreholes which go through a sand filtration system before being distributed. The smaller hamlets and villages see to their own water provision. Fort Brown will sometimes have to purchase tankers of water from Grahamstown during drought periods.

4.2.1.5 Assurance of supply

The two purification plants are able to supply Grahamstown with sufficient water for all needs and for the foreseeable future SHOULD the operation and maintenance and rehabilitation of the infrastructure be done according to regulations. Unfortunately this does not seem to be the case at present. James Kleynhans Water Treatment Works on its own can supply Grahamstown's entire water need. However, as Mr Dredge (previous financial manager at Makana) states, during periods of severe drought there will not be enough for everyone. In addition, there is currently a huge demand for water in the Eastern Cape which will continue to grow in the years to come as an increasing number of people receive waterborne sanitation, as the Coega project comes on line and the proposed extension of the pipeline from James Kleynhans to Port Alfred and the coast becomes a reality. Water from the Gariep Dam transfer scheme also supplies the Sundays River irrigation scheme via the Darlington Dam and from there to Nelson Mandela Metropolitan Area as well as areas in the Orange Free State.

4.2.1.6 Quantity

Over-abstraction of surface and groundwater from local sources maybe of concern in Makana. The Department of Water Affairs and Forestry (DWAF) is responsible for the monitoring of surface and groundwater quantity. However, the data from these monitoring points are insufficient for water resource planning and complete assessment. Environmental flows and water allocations for domestic, agricultural and industrial use have to still be determined. There is also:

- no assessment of existing lawful use of water including that used for agricultural use;
- no collated data on the present water reserves and demands within Makana that have been made accessible to the LEAP (2002) team, or is available in an accessible form to stakeholders;

- no model for projected estimates of domestic, educational (in particular Rhodes University's projected numbers of entrees), industrial and agricultural growth and therefore water demands.

4.2.1.7 Drinking Water Quality Monitoring

The Nelson Mandela Metropolitan Municipality (NMMM) Laboratories analyze water samples for a wide range of parameters every two months but it is unclear how the test results are shared and used.

Samples are also sent off every two-three months to NMMM laboratories for analysis and the same concerns apply as at Waainek. In addition to the water quality parameters as measured at Waainek additional ones include conductivity and free chlorine.

BOX 4.1

Drinking water is divided into two categories. Class 1 is the recommended operational limit and Class 2 covers the maximum allowable chemical content that can be safely consumed for a number of months to years (from 3 to 7yrs with reasonable safety. Please consult the DWAF website to obtain "A drinking water quality framework for South Africa" for details of water purification and management.

Microbiological.

- Total coliforms measured in counts/100ml (evaluation of water treatment processes, microbial growth in the distribution system or post-treatment contamination of drinking water).
- Faecal coliforms (water is contaminated with faecal waste of human or animal origin) or *E. coli* (rarely found outside intestines, except where faecal pollution has occurred).

Physico-Chemical parameters

- pH (taste, corrosivity).
- Turbidity (turbidity indicates poor water treatment, cross-contamination and/or corrosion, and is problematic in that it prevents effective disinfection).
- Residual water treatment chemicals i.e. disinfectants (for example, aluminium from aluminium sulphate dosing) contribute to the conductivity of calcium, magnesium, potassium, sodium, zinc measured in mg/L, nitrates, nitrites, ammonia, sulphates, chlorides and fluorides.
- Inorganic chemicals, micro-nutrient and metals which are measured in micrograms per litre. In this group are found the most dangerous contaminants. In order of danger these are cyanide, chromium, cadmium, mercury and lead.

Von den Meden's work (2004) points to problems with the quality of data monitoring as well as accessing and coordinating this information. The water chemistry data record from DWAF for Grahamstown water supply dams end in 1999.

4.2.1.8 Tariffs

There is currently no block tariff system in place so tariffs are the same regardless of amount consumed. DWAF-PDG attempted to calculate and pilot a block tariff, but an agreement on how to implement it fairly could not be reached, particularly as it would make charges to institutions (such as University and school hostels) unaffordable. There are currently 8313 registered indigent households, which probably accounts for most households who qualify. Although there is no indigent policy those that qualify are

supplied with 6 kl of free water which is covered by Equitable Share. If the amount of water exceeds this allowance they are supposed to be billed accordingly.

Some general points to note as taken out of Muller and Burgess (2007) are:

- There are no back up pumps;
- Water quality monitoring programmes are inadequate;
- There is uncertainty as to whether there are routine maintenance schemes for reservoirs or pipelines.
- Consumers in Grahamstown have an expectation of service delivery (quality as well as quantity of potable water), yet there appears to be inadequate controls and mechanisms in place to ensure that the WTW are able to deliver a consistent product.
- There are no standard operating procedures for action in the event of service delivery interruption (either of quantity or quality).

With the pressures of population growth, together with the increased need for economic activities, waste generation and land use, and poor precipitation in Makana, demands on the freshwater resources will increase. At present assurance of supply is not the concern but rather the management of the available water.

4.3 Water Service Planning and Delivery Assessment

4.3.1 Water Services Development Plan

The WSDPs have repeatedly surfaced as key tools for measuring municipal water supply and sanitation for areas under the WSA's jurisdiction (DWAF, 2004). Often, as in the case with Makana Municipality, the final draft of the WSDP is drawn up by a consultant under the management of the District Municipal and not the Local Municipality itself. However, where analyses of a WSDP is useful, even if completed by a consultant, is that the available information can reveal levels of access to vital sources on information.

As a WSA Makana Municipality has to complete a WSDP as part of their IDP. One of the critical gaps in local government is a lack of understanding of the full scope of a WSDP and IWMP. Members of staff are unable to complete a WSDP and IDP independently and need more training and assistance. To be able to complete these detailed plans independently, a comprehensive data-collection system should be in place, which is not the case. To be able to utilize such data, analytical skills are required. These skills are usually hired in the form of consultants who seldom have the time or the capacity to train relevant staff.

Research findings on the business elements of water services delivery and the compilation of a WSDP indicated that Makana municipality may have competency to complete some of the tasks. However, they will need help to meet tasks relating to water conservation and demand management; the provision of an operational water balance for water supply and sanitation for the entire Local Authority; and the provision of an environmental water balance for the average wet and dry seasons.

Table 4.6 provides a summary outline of the 2006 WSDP for Makana Municipality with level of information supplied assessed. Information from the WSDP and some comments are recorded in the left

hand column. The numbers and colour in the section correspond to those of the outline of the WSDP. The italics indicate the authors comment.

Table 4.6 Summary outline of the Makana 2006 WSDP with information assessed as follows: 3 = full, 2 = some, 1 = scant, 0 = no information, in the right column. The accuracy assurance of the information could not be judged by the researchers except where contrary information is already known.

BUSINESS ELEMENTS OF WATER SERVICES PLANS	Makana information supplied
1. SOCIO-ECONOMIC PROFILE	
Demographics	Situation assessment = 2 Future trends and goals = 2 Strategic Gap analyses = 2 Implementation strategies = 0
Health *Potable water quality good* *No reported cases of water related health problems* *Implementation strategy suggested*	Situation assessment = 1 Future trends and goals = 2.5 Strategic Gap analyses = 1 Implementation strategies = 3
Employment and income *Although all figures have been provided they are not remotely accurate, being much too low or incorrect. The figure quoted in table 1.3.1.1 of workforce is 5565 while 42 % of the population quoted in section 1.1.21 comes to 5885. The professional category is also much too low. Grahamstown is a town of professionals, (450 at RU plus teachers at schools, lawyers, judges & health workers at hospitals). I therefore suggest that the income profile is also incorrect. I agree with the % of indigent households*.	Situation assessment = 2.5 Future trends and goals = 0 Strategic Gap analyses = 2 Implementation strategies = 3
Economics WATER SERVICES BUSINESS ELEMENTS	Situation assessment = 0 Future trends and goals = 0 Strategic Gap analyses = 0 Implementation strategies = 2
2. WATER SERVICE LEVEL PROFILE TECHNICAL	
Residential consumer units *There is no grey water management plan.* *Upgrading of water service infrastructure has been noted, but there are no plans to upgrade data collection and analyses.*	Situation assessment = 3 Future trends and goals = 3 Strategic Gap analyses = 3 Implementation strategies = 3
Public institutions and dry industries *Inadequate budget.* *No bylaws promulgated.* *Infrastructure should be upgraded.*	Situation assessment = 3 Future trends and goals = 3 Strategic Gap analyses = 3 Implementation strategies = 3
Wet industries *Monitoring of effluent discharges is problematic.*	Situation assessment = 3 Future trends and goals = 3

No bylaws.	Strategic Gap analyses = 2 Implementation strategies = 3
Raw water consumers N/A	Situation assessment = 3 Future trends and goals N/A Strategic Gap analyses N/A Implementation strategies N/A
Industrial consumer units *Tannery & brickworks in Grahamstown: there is no information about use, effluent or plans to institute such actions.*	Situation assessment = 3 Future trends and goals = 1 Strategic Gap analyses = 1 Implementation strategies = 0
Industrial permitted effluent releases	Situation assessment = 0 Future trends and goals N/A Strategic Gap analyses N/A Implementation strategies N/A
3. WATER RESOURCES PROFILE TO MEET DEMAND	
Water resource *Ground water sources are not regularly monitored, mapped or recorded except those that belong to the municipality.* *Water records are not processed.* *No records of return flows.* *There are plans to implement a better groundwater management system.*	Situation assessment = 3 Future trends and goals = 3 Strategic Gap analyses = 3 Implementation strategies = 3
Water quality *No water quality monitoring of reservoirs or waste water takes place.* *No water quality monitoring database.*	Situation assessment = 0 Future trends and goals = 0 Strategic Gap analyses = 0 Implementation strategies = 0
Water borne sanitation *70% of households to be provided by 2010.* *Projects largely focussed on sanitation provision.*	Situation assessment = 3 Future trends and goals = 3 Strategic Gap analyses = 3 Implementation strategies = 3
4. WATER CONSERVATION & DEMAND MANAGEMENT	
Water resource management interventions *Insufficient number of district meters to enable water loss calculation.* *Database of meter readings not in place.*	Situation assessment = 1 Future trends and goals = 2 Strategic Gap analyses = 0 Implementation strategies = 3
5. WATER SERVICES INFRASTRUCTURE PROFILE	NB section
Water services infrastructure: components treatment works, pipelines, reservoirs, reticulation sanitation *Information for the Grahamstown sewerage plant is lacking and no refurbishment plan provided although need for upgrade is noted. New projects have been identified.*	Situation assessment = 3 Future trends and goals = 0 Strategic Gap analyses = 0 Implementation strategies = 0
6. WATER BALANCE	
Provide operational water balance for water supply and sanitation for the entire Local Authority indicating distribution of water supply to the various sectors, water	Situation assessment = 1 (only estimates) Future trends and goals = 0

losses, final effluent discharges and reuse. *No figures were provided but some figures for bulk inputs are available.* *Monthly meter readings are not done over the entire area so household consumption could not be calculated.* *Waste water volumes could not be provided.* *There is no database.*	Strategic Gap analyses = 0 Implementation strategies = 1
7. WATER SERVICES INSTITUTIONAL PROFILE	
Limited service level possible due to financial and staff shortages as well as inadequate training. Manuals and procedures are missing and there is no free basic water policy. *Bylaws are not promulgated.* *Capacity development is needed.*	Situation assessment = 3 Future trends and goals = 0 Strategic Gap analyses = 1 Implementation strategies = 1
8. CONSUMER SERVICES PROFILE	
There is no education for basic water services or pollution awareness. *Current programme has developed resources.* *In the past, the Masakheke project provided sanitation education.* *Most problems reported were blockages.* *Although the reported consumer services appear to attend to 100% of complaints we have seen contrary evidence. Our estimate would be a 75% service.*	Situation assessment = 3 Future trends and goals = 3 Strategic Gap analyses = 3 Implementation strategies = 3
9. FINANCIAL SERVICES PROFILE *The information supplied is inadequate*	
Capital funds *Despite the reported costs the water volume could not be supplied.* *The main problem is that MIG funds are under spent (Cacadu DM report).*	Situation assessment = 2 Future trends and goals = 0 Strategic Gap analyses = 0 Implementation strategies = 0
Operating cost and income *Large gaps between incomes required and received.* *Inadequate O&M finances available.*	Situation assessment = 1 Future trends and goals = 0 Strategic Gap analyses = 0 Implementation strategies = 0
Tariffs and charges	Situation assessment = 0 Future trends and goals = 0 Strategic Gap analyses = 0 Implementation strategies = 0
Free basic water and sanitation	Situation assessment = 0 Future trends and goals = 0 Strategic Gap analyses = 0 Implementation strategies = 0
Charges and block tariffs *No policy for tariff structure in place.*	Situation assessment = 0 Future trends and goals = 0 Strategic Gap analyses = 0 Implementation strategies = 0
Sales and income	Situation assessment = 0

	Future trends and goals = 0 Strategic Gap analyses = 0 Implementation strategies = 0
Metering and billing	Situation assessment = 0 Future trends and goals = 0 Strategic Gap analyses = 0 Implementation strategies = 0
PROJECTS	
No maintenance backlog was available. *Six projects to develop various operational plans to improve compliance are listed, none of which are funded.* *Mainly focused on sanitation backlog eradication.*	Situation assessment = 2 Future trends and goals = 2 Strategic Gap analyses = 1 Implementation strategies = 2

4.3.2 Operation and Maintenance

Grahamstown is currently experiencing some serious issues with the operation and maintenance of water and sanitation infrastructure. There are regular reports of sewage leaks (which causes serious pollution) and burst pipes resulting in large amounts of sediment in people's water as well as significant water loss. For example, a field trip to Lavender valley in 2007 revealed two burst sewage pipes. One of the leaks had been occurring for over four years and the tributary was filthy as a result, both from sewage and accumulated litter. In March 2007 a member of the KCC reported a leaking sewerage pipe up near the kennels while in September 2007 it was reported at a KCC meeting that the sump system in Lavender valley is not operational and the sewage system can't cope with it. It was revealed that Garry Everton (the manager of the sewage works) is very concerned with the sewage systems capacity even though an upgrade is happening (KCC Sep 13th 2007).

As the Grahamstown's Residents Association (2007) notes, "Grahamstown's infrastructure is indeed beginning to disintegrate" evidenced by the recent power and water cuts. They also state that the ageing 'inherited' infrastructure "as described by our Mayor, is not being adequately maintained and there appears to be no coordinated plan for spending on vital maintenance, nor for capital provision to keep abreast of demands." Mullins (2008) notes that new sewage lines are being placed in Grahamstown East, an area previously not serviced, which will place additional pressure on the current infrastructure.

In 2006 the effects of this ageing infrastructure was felt by all of Grahamstown when we had a mini water crises: residents water supply was cut off, some for over a week and when water did come out of the tap it was often a brown, smelly trickle, full of sediment. There was also a water quality scare when fish died at Rhodes University's experimental fish farm although later tests revealed the water was fit for human but not for fish consumption. The reason for this crisis was two fold: the electricity supply line to Waainek water works was struck by lightening; and the shifting and breakage of old pipes due to them being in a clay layer.

The problem is not going to go away when one considers the ever growing population and the poor culture of service payment. As Michael Whisson wrote in 2006 "…the sum of unpaid accounts has steadily increased such that it is now in excess of one year's operating budget, which has virtually eliminated the capacity of the municipality to purchase new equipment and squeezes the maintenance budget to about 6% of the operating budget." (Ref. Lausanne Olvitt:" Back to Basics: a story about people and water in Grahamstown".] Currently payment for services (throughout the town) is at 45%,

which means that payment in Rini, the former township region of Grahamstown, is likely to be less than 20%. An interview with Mr Dredge (pers.comm., 2007) indicated that outstanding water charges amount to over R20.29 m owed by 16,565 debtors where the biggest defaulters are lower middle income (around R2 500 pm) households and government institutions. The revenue generated from service charges does not cover expenses for these services (there is a real loss of R1.6 million) and falls well short of operations and maintenance requirements which translates into crisis management and demand maintenance, supply outages and deterioration of service infrastructure. Mr Dredge (2007 pers.comm) also revealed that there is no longer a budget for operation and maintenance. Consequently water meters are not replaced (all old), and there is crises management on piping where they are replaced as they break rather than a systematic overhaul. The pumps are currently in need of replacement or overhaul, while it costs ½ million to overhaul one pump.

Currently the water services in Makana are focused on developing and improving the sanitation infrastructure as per the Millennium Development Goals. However, the consultants for the WSDP highlight the dangers inherent in not having a developed and adhered to O&M plan. Currently there are both staff (few and undertrained) and financial constraints to enable comprehensive O&M.

- The tariff structure does not allow for O&M resulting in asset stripping.
- Staff duties are not ring fenced to water services provision.
- Not all procedures, manuals and plans are in place to measure performance against agreed benchmarks or levels of service.
- The importance of the Operational Health as Safety Act is not complied with.
- Once the full scope of the routine and repetitive maintenance functions have been determined the tariff structure is supposed to be adjusted but it is not.
- The actual income and expenditure for previous years were not supplied.
- Obtaining funds to implement an O&M project is a challenge and tariff structures should be adjusted to cater for this.

4.3.3 Sanitation Provision

4.3.3.1 Service levels

Access to RDP-level sanitation (at least VIP) applies to 58.7% of local and 71.4% of district households. The remaining local households are served by pit (2.9%) and bucket (17.5%) latrines, or don't have a sanitation service (20.8%). According to a Gap Analysis undertaken by the Cacadu DM (November 2005), approximately R100.09 m is required for Makana to address urban backlogs in water and sanitation, the bulk of which applies to Grahamstown (R91.11 m), followed by Riebeeck East (R5.22 m), then Alicedale (R3.75 m). In Makana, the replacement of the remaining 800 buckets in the bucket sanitation system is a priority. Riebeeck East is the third town and sanitation is via the bucket system (being replaced) or septic tanks.

Grahamstown Disposal Works (GDW)

Sanitation services in Grahamstown are either VIPs, bucket systems or waterborne sewerage.

"The GDW is currently monitored by Makana Municipality on a daily basis for hydraulic loading via a flow meter at the head of the works; and pH is monitored at the anaerobic sludge digesters (Everton, pers comm. 2004). This is done in order to determine the amount of lime which must be added for pH balancing and optimum operation of the works. Sampling of final effluent quality is also taken and analysis done by the Rhodes University Environmental Biotechnology Research Unit located on the premises. In addition to this monitoring of the STW, Makana has contracted the quarterly monitoring to the Nelson Mandela Municipal Metropole (NMMM) under the Acting Water Reclamation Officer.

Sampling is taken at 10 points along the treatment process and analysed for pH, conductivity, total dissolved solids, chlorine, nitrogen, ammonia, chemical oxygen demand total solids, suspended solids and volatile matter" (Gambiza and Palmer, 2004)**.**

Mayfield Oxidation Ponds (MOP)

The Mayfield oxidation ponds receive influent from the bucket system. The NMMM also monitors MOP on a quarterly basis. There is no bulk discharge of effluent from the MOP as final effluent is used for irrigation and therefore DWAF monitoring requirements and effluent quality standards differ to those of the GDW. The final effluent must therefore comply with DWAF water quality guidelines for irrigation (the permit conditions). (Gambiza and Palmer, 2004).

In terms of the Grahamstown STW licensing, the quality of water from the STW entering the Bloukrans River catchment should be monitored every one to two months. The DWAF Port Elizabeth offices have presently taken over this monitoring. Upstream of the STW, the possible influences of e.g. town water runoff are monitored in the East and West Market Street regions, within the Bloukrans River. With the intention of monitoring STW effects on resource quality, three further sites are monitored above and below the Grahamstown STW (Gambiza and Palmer, 2004).

Additional monitoring of various other institutions' effluent, such as the hospital, is done on an ad hoc basis. There are plans by the Engineering Department to outsource monthly monitoring to a local laboratory. DWAF monitors GDW final effluent quality where it is released into the Bloukrans River, according to the NWA, Section 21(f) and (h). A full sanitary analysis of final effluent is done on a monthly basis by a contracted laboratory in Port Elizabeth. DWAF are responsible for compliance monitoring against the General Limits of effluent discharged into a water body and can take legal action against the municipality if effluent does not comply with standards for a continuous length of time. There is currently little cooperation between DWAF. Monitoring procedures and municipal monitoring results in duplication of testing and there is no information sharing between the two bodies (Gambiza and Palmer, 2004).

Sanitation in Alicedale centre is via septic tanks, and in the former township area (there is only 1) there is waterborne sewerage. There is concern by the Alicedale Administrative Unit that tourist chalets above the New Years Dam have inadequate sewage disposal. On days of high rainfall, sewage may spill into the dam directly. In addition, the evaporation pond system for sewage treatment is not large enough for growth and often threatens to overflow during heavy rain. Riebeeck East's sanitation is via the bucket system (being replaced) or septic tanks.

4.3.3.2 Sanitation issues

In 2001, DWAF together with DANCED support ran 9 test cases through South Africa in developing ways of implementing sustainable pollution identification and control in dense settlement regions (DWAF, 2001). Rini, as part of Grahamstown, was one selected test area. The findings of this case study were discussed by the Project Team with the Assistant Directors of Infrastructure and of Environmental Health, Makana Municipality (July 2006), and are compared to the present day situation.

i) *Test case as recorded*: The pit latrines (in Rini, higher density settlement of Grahamstown) regularly fill up and overflow in wet weather. This overflow gets into nearby watercourses. This is likely due to a clay layer some 50 cm below the surface, and hence subsurface inflow to the pits, or due to surface runoff into the pits.

Present day situation: MIG funds have been sourced to replace all pit latrines with water borne sewage. This is ongoing, together with the replacement of 800 household bucket systems.

ii) *Test case as recorded*: Blockages in the fully reticulated part of the town are not reported or cleared timeously. There is also a lack of funds to effectively maintain this service, hence its frequent failure.

Present day situation: Although the replacement of inadequate household sanitation systems with water borne sewerage has been rapid in Makana, particularly in Grahamstown, the simultaneous education in health and how to effectively use and maintain the new systems has been considerably inadequate due to the incapacity of Makana health officials to keep pace (the District Municipality has placed 2 health care workers in Grahamstown). Consequently, lack of understanding on how the sanitation system functions and how to use the toilets is widespread (Pinky Hermanus, Assistant Director Engineering, Makana Municipality, pers comm. May 2006). This has caused an ever-increasing problem with blockages in households, pipes and manholes. Consequently, Makana Municipality has recently introduced daily drive-through inspections of the roadways within new developments assessing the presence of leakages.

Waterborne sanitation is the only option considered by the councillors and Technical and Infrastructural division. However, the newly developed dense settlement area Vukani, Grahamstown, is an example of the problems straining Makana engineering. After just one year, a constant stream of complaints of blocked toilets, cisterns breaking, manholes blocked with rocks and garbage and so on were received (Pinky Hermanus, pers comm. May 2006). Poor sanitation is often seen as a technical problem that requires a technical solution, but sanitation problems are often caused by people's beliefs, preferences or habits, and not least of all an understanding of the system provided. Any sanitation programme that does not take these into account will have no lasting impact.

Residents are responsible for maintaining toilets, pits, pipelines and sewers within the boundaries of their property. Makana Municipality have found like so many other local authorities (Atkinson, 2002) that users believe that if they pay the municipality a monthly fee for water and sanitation, the municipality should fix their toilet when there is a problem with it. Misunderstandings can rapidly lead to resentment and malfunction and Grahamstown has recently had a spate of newspaper articles and community-written letters exemplifying this development.

Another issue identified by the assistant Director of Parks, Forests and Recreation is that a lot of water that enters the sewage works comes off people's roofs which Belmont Valley sewage treatment works doesn't have the capacity to deal with.

4.4 Municipal Service responsibilities affecting water resources

4.4.1 Solid Waste Management

4.4.1.1 Municipal Mandate/ capacity

The municipality (through the department of Environmental Health) has a number of important responsibilities related to solid waste that will impact water resources, positively or negatively, depending on how well their mandate is carried out. These responsibilities include domestic refuse collection, provision of suitable garden and rubble refuse facilities as well as suitable landfill sites,

cleaning of the central business district streets and public toilets. Other functions undertaken by Environmental Health include the provision and servicing of 52 garden refuse dumping spots or facilities identified through municipal ward meetings as well as education and environmental awareness campaigns targeting responsible solid waste disposal and waste management. Solid waste is collected on a rotational basis through a black bag system, which is supplemented by large skips or hoppers in some areas for household rubbish, or for garden refuse. Census figures for 2001 indicate that the majority of households in Makana (86.62%) have access to municipal refuse collection services, while the bulk of the remaining local (11.16%) and district (24.09%) households make use of their own refuse dumps.

The citizens of Grahamstown on the whole are irresponsible litterbugs. Discarded fast food containers, plastic bottles and chip packets are to be found in all parts of town. The garden refuse containers provided by the municipality are misused and generally abused. Illegal dumps are scattered all over the township. Often rubbish bins are overturned by vagrants. Most of the rivers and stormwater systems are clogged with solid waste. The Local Environmental Action Plan (Gambiza & Palmer, 2004) has identified one of the environmental issues of greatest concern to be domestic solid waste management and associated litter problems, together with land use. In particular, waste washed away with stormwater runoff is a serious problem in the Belmont Valley / Bloukrans River area (Gambiza & Palmer, 2004). Mr Tito Mboweni, the governor of the Reserve Bank was shocked at the state of Grahamstown. A KCC photo monitoring exercise identified that the three issues of greatest concern affecting Grahamstown's rivers was litter, people using the canals/ river channels as a toilet and sewage overflows. At a ward meeting in March/April 2007 the public expressed a real concern at the state of littering in Grahamstown and there were thoughts of having a campaign to deal with this problem. In addition, a councillor expressed concern that Grahamstown is increasingly becoming one of the dirtiest cities in the province and litter is becoming an eyesore in the townships (KCC minutes 12th March 2007). Mr Matabese, (the community liaison officer for the municipality) wrote a story in the municipality newsletter on dumping sites as illegal dumping is one of the municipality's concerns. Mr Matabese (pers.comm 2007) explained that there are also problems with legal sites as people don't put their waste in the containers but leave it lying around. The children play there and are in danger of contracting diseases.

A study by the DWAF in 2001 indicated that there is a lack of knowledge on how the solid waste system is to be used, and the purpose of the skips. Bags are often put out too late, are not collected and either put next to the skips, or on the roadside. Animals get into these bags and spread the litter. Some skips may also be poorly placed. The Local Authority indicated that proper use of the solid waste system would save them the costs of 1 vehicle, 2 drivers and 8 workers per month, freeing up these workers and the vehicle for other jobs. The problems in the solid waste stream were addressed by awareness building programmes around the use of the collection of the bags system, and the skip system. This addressed both, "Why it is important to use the system properly", and "How do you use the system effectively". Additional solid waste skips were also acquired, and were painted with awareness material that highlights the most appropriate use of the skips.

The situation has declined since this study was conducted, particularly with the urban influx of people exacerbating the situation. There is, however, significant effort on behalf of the Cleansing Department to work with ward councillors, organising local meetings in an effort to come to some agreement with the local communities as to how to cope with this problem. This is not linked to any education or awareness programme. A problem with these community meetings is that councillors very often do not

arrive themselves and the community has a sense of non-interest in their situation (David Dell, Manager Cleansing Department. pers.comm., 2006). Workers responsible for street cleaning, exacerbated by inadequate vehicle supply, are unable to cope with the volume of either uncollected waste materials, or poor community waste awareness and illegal dumping (David Dell. pers comm. 2006).

4.4.1.2 Groups involved

There are a number of groups in Makana who are actively trying to deal with this issue of solid waste which has negative effects on our water resource. The Junior Council supported by Soroptimist International (SI) and the Makana City Council play an active role in keeping Grahamstown clean. In 2006 they launched the "We are Keen to Keep Grahamstown Clean" campaign with the aim of cleaning Grahamstown, educating citizens and inculcating a change of attitude in the learners. All the schools participated in a clean up day. In 2007 it was decided that each month 2-3 different schools would participate in cleaning up a selected area. A project was initiated, in collaboration with Mr Esterhuizen of the municipal Health Department, to paint fifteen 44 gallon drums, one for each school, which were placed in the city centre. However, a problem is that learners from Grahamstown East don't want to participate and they have to be bribed to do so. This is in the context where the thinking is that littering is okay as it creates jobs (Mr Planga, pers.comm 2007, Director of Community and Social Services). The Junior Council are also investigating recycling possibilities and there are ideas of having a shame campaign where once a week the local newspaper will publish a photo of someone littering.

Siyacoca is an initiative by the residents of a localized township area of Grahamstown, supported by Makana Municipality. In response to their disgust with their areas' litter and domestic waste problem, they began a programme in 2005 run by volunteers and spearheaded by Ms Gladys Tyatya who also works in the Environmental Education Unit of Rhodes University. The steering committee, elected by locals, persuaded the local high school to use the problem as a community and social awareness project. Volunteer learners together with interested parents had a pre-cleanup assessment, analyzing waste contents and noting favoured dumping areas. They then cleaned the areas, particularly around skips. Post cleanup, the learners and parents continued to observe the waste problems. Awareness of the project and their motivations behind it (a local health issue) were continually brought to the attention of the whole school. Further cleanups occurred, again using the same format, with the steering committee members assessing the results and feeding back to the Cleansing Department at Makana Municipality. This project is considered a success, although with problems and less than 100% effectiveness.

4.4.2 Storm water management

Improper drainage and development within floodplains was identified by stakeholders as an environmental issue of concern. The Water Services Act (Act 108, 1997) states that the Makana Municipality must take measures to prevent substances other than uncontaminated storm water from entering any storm water drain, or any water course, except in accordance with the NWA. The Municipality does not presently fully comply with this directive. The present state of storm water removal, particularly in the low income high density areas of Makana, together with the poor litter control (see later), ensures serious contamination of storm water drains and ultimately water resources. The stormwater system and roads range from tar roads with underground stormwater drainage, through to unpaved roads without any formal system of runoff collection.

4.4.3 Alien vegetation

Makana suffers from a moderate infestation of invasive alien vegetation, particularly of the acacia species. Working for Water (WFW) has been doing extensive clearing in the catchment and is in the process of handing back cleared pockets to the municipality to manage. A number of concerns were raised at a KCC meeting (January 2008) that relate to the sustainability of this initiative. Firstly, the clearing is not being done adequately i.e. the trees are being felled but the stumps are not being treated so coppicing and thus reinvasion is very likely. Secondly, there are concerns regarding Municipal follow up. Mr Pryor (Director of the Albany WFW group) expressed concern regarding WFW areas handed back to Council, as they are being reinvaded. As WFW's mandate is to hand back Municipal ground, the municipal boundaries of responsibility are expanding. Mr Pryor emphasised the need for a long-term ongoing follow-up plan, with a dedicated catchment care team. There is no quick solution to invasive alien plant control, and without ongoing care the land will revert to its former invaded state (KCC January 2008 minutes). Mr Bates pointed out that there are inadequate funds in the municipal budget to manage all the cleared areas being handed back to them and requested that Mr Pryor assist council in establishing a realistic budget for the maintenance of cleared areas now handed back to the municipality. Municipal follow-up could be conducted by the dedicated 'out of house' Kowie Catchment Care team. This indicates the value of volunteer groups working in Makana, where they both create a forum/ space for stakeholders to communicate their concerns and share ideas with each other and also mobilize invaluable volunteer assistance in solving problems.

There are indications that unregulated development could have negative consequences on the water resource. For example, a large soil dump has been photographed meters away from a river and there are concerns that if there are heavy rains, the soil will wash into the stream, together with the invasive alien plants growing on it. There is also concern that the Municipality will build on it, considering the lack of stability of the pile of earth. While the Town Planner is busy and pressured, it is insufficient reason for not responding to public concerns.

4.4.4 Pollution Sources

There are currently no by-laws in Makana Municipality that govern Trade Effluent Standards. Toxins, heavy metals, organic loading and discharge quantities relevant to each industry type should be monitored at point of release into the receiving sewer. DWAF identifies that dairies discharging effluent into sewers or significant quantities (more than $50m^3$ as stipulated by the NWA and DWAF) into the environment without adequate prior treatment or containment should be monitored. Currently the industries identified in this category include Bushman's River Taxidermy in Alicedale and dairies, piggeries and abattoirs. Settlers Hospital should be included in point source monitoring programmes.

Tanneries

The Tannery industry has the largest water consumption, and therefore effluent discharge, in Grahamstown. There are a variety of processing technologies used that could impact water quality, particularly in terms of sodium content, chrome and organic loading which should be tested to establish current levels and targets for tanneries to strive towards.

In Alicedale, a local tannery uses a holding tank for effluent where evaporation of water is the method of quantity control. However, during high rainfall excess flows occur onto the surrounding land. Groundwater and high flows during storms will cause runoff directly into the Bushmans River just upstream of Alicedale itself and downstream to other water users (Gambiza and Palmer, 2004).

Abattoirs

Abattoir wastewater consists primarily of organic wastes such as fats and blood as well as disinfectants and detergents used in wash water. Monitoring of discharge should be done to establish current discharge quantities, organic loading rates and to identify any other potential toxins present in abattoir wastewater (Gambiza and Palmer, 2004).

Laboratories

Current investigations have shown all laboratories and clinics to have adequate mechanisms for disposal of liquid as well as solid hazardous waste. However, Rhodes University has been identified as a significant source of waste if disposal mechanisms fail. A sampling point should be identified for random monitoring to ensure no hazardous waste is released into municipal sewers (Gambiza and Palmer, 2004).

Other

Other industries which should have effluent monitoring are any dairies discharging effluent into sewers or significant quantities (more than $50m^3$ as stipulated by the NWA and DWAF) into the environment without adequate prior treatment or containment. Currently the industries identified in this category include Bushman's River Taxidermy in Alicedale, currently being inspected by DWAF; dairies; piggeries; and abattoirs (Gambiza and Palmer, 2004).

Alicedale Evaporation Ponds (AEP)

The AEP were designed for a low flow rate and thus have no effluent discharge at all. No effluent quality monitoring is, therefore, required by law. However, due to the increase in number of houses recently added to the water borne sewerage system of Trans Riviere and Kwanonzwakazi, the design capacity of the ponds has been exceeded. There is a significant quantity of effluent discharging into the environment with no adequate planning and upgrading of facilities. DWAF officials were not aware of this situation at the time of investigation. This highlights the need for flow rate monitoring and cooperation between municipal monitoring and DWAF monitoring; and interpretation of monitoring results (Gambiza and Palmer, 2004).

4.4.5 Water Ecosystem Health

The assistant Director of Parks, Forests and Recreation stressed that the state of the rivers are unacceptable which is backed up by a report based on a photo-point exercise of Grahamstown's rivers undertaken by members of the KCC monitoring (KCC photographic point monitoring task team 2007). With this context in mind, the Project Team undertook biomonitoring at six sites on the Bloukrans River, and at the confluence of the Palmiet and Berg Rivers in Thomas Baines Nature Reserve (see Appendix 1) to examine the quality of the river water. A summary of the results is as follows:

a) Water quality is poor in the Bloukrans River downstream of Grahamstown sewage treatment works. These issues could become a problem in Alicedale below the Evaporation Ponds.
b) Salinity is naturally high but is being worsened by farm dams with associated evaporation, and outflows from STW and industries.
c) Nutrient enrichment is a problem, and the role of informal settlements, STW and fertilizers on lands downstream of Grahamstown in particular needs to be assessed.

In most of Makana water ecosystem health is poor to fair. Problems are poor habitat availability, salinity, and poor water quality as a result of impacts from STW, informal settlements and industrial discharges.

Von den Meden (2004) did a study on the water quality of Makana's rivers, using water chemistry and biomonitoring data, which revealed that on the whole the present ecological status of Makana's water resources can be classified as fair, although there are some sites which have a poor Present Ecological Status. Water chemistry tests revealed that Makana's water resources are impacted. According to nutrients and salts the Great Fish River is in a fair and poor state respectively. Every site was classified as poor in terms of salt content, while six out of eight could be classified as good in terms of nutrient levels. However, the algal growth in the Bloukrans River indicates nutrient enrichment. The geology of Makana are rich in phosphorous and salts which could explain the high levels of nutrients and salts although they have certainly been impacted by activities such as "irrigation return flows and domestic effluents. "Measurable toxicity of out-flowing effluent from the Grahamstown sewage treatment works (STW) was (also) of concern".

A site in Thomas Baines nature reserve was classified as poor, particularly related to water quality, which is unexpected due to isolation from human activities. Von den Meden (2004) states that one possible explanation is the recent tar dump upstream of the site, associated with road works on the nearby highway. Such results indicate the "importance of environmental responsibility in all development undertakings in the municipality" (Von den Meden, 2004).

Leap records the results of a water quality audit that was undertaken as follows:

- "The Bloukrans River downstream of Grahamstown residential and industrial areas and the sewage treatment works is in a *Poor ecological state* according to the physico-chemical, biomonitoring and ecotoxicological data. The state of the River was also a primary stakeholder concern.
- There was *no nutrient enrichment* (total inorganic nitrogen and soluble ortho-phosphates) at any of the DWAF water quality monitoring sites. *However,* there were no DWAF water quality monitoring data available for the Bloukrans River to date [input still ongoing by DWAF] but the algal growth within the river is indicative of enrichment.
- There was *measurable ecotoxicity* of the influent and effluents around the Grahamstown Sewage Treatment Works (STW). This preliminary study indicates the outlet pipe into the STW dam was *less* toxic than the outlet pipe into the *River*...
- At various sites on the Bushmans and Kariega Rivers, the water is too *salty* to irrigate or use in domestic or livestock consumption.
- There is significant evidence of *toxic salt levels* at many of the DWAF water quality sites within Makana, dominated by magnesium sulphate and sodium chloride. However, there is a need to determine whether these values are just indicative of low flows combined with abstraction and evaporation; and/or the natural state, reflecting the ancient marine shales underlying parts of Makana….
- The Alicedale tannery effluents, and other potential effluents with recent developments, are also of concern…."

4.5 Relationship between the Municipality and Community

The relationship between the municipality and the community has a number of tensions as well as positive connections that could be reinforced to see the second aspect of IWRM and local government come to pass – local groups helping to see IWRM become a reality.

4.5.1 Communication

Communication between the municipality and general public is generally poor although there are some positive aspects.

In 2007 a quarterly newsletter called Makana News was instated which covers everything that happens in the municipality and is aimed at being a communication tool. It is distributed to shops in the township, Pick and Pay, Checkers, Shoprite and municipal offices and some go to Alicedale and Riebeeck East. The poor quality of the first newsletter was noted by the project team.

There is a system in place for the community to report water and sanitation problems to the local Engineer's Office either by phone call during office hours to the local city hall number, or visiting the City Hall. There is a book that is used to record every fault. However, no hot line exists and this office is in the town centre and requires a long walk or bus fare if no personal transport is available - 75% unemployment in Grahamstown, for example, means most people are unlikely to report small incidents until they are much larger problems. All concerns regarding Municipal water and catchment quality issues can also be reported to the DWAF Toll Free Line 0800 200 200 or contact Ms Pamela Adams, Department of Water and Forestry, T: 012-336.6956/6957, F: 012-336.6641, E: adamsp@dwaf.gov.za] (KCC Jan 2008 minutes).

At a ward meeting in March/ April 2007 it was disclosed that the municipality is hoping to get a software package that will enable them to send an sms to its citizenry to inform them of problems they need to be aware of, such as water cuts. Nothing has yet come of this.

A frequent frustration experienced by citizens is the lack of response from the municipality to both their complaints and attempts at communication. Examples abound. At the Makana Environmental Forum this issue of communication channels was raised. Jim Cambray (chairperson of the KCC) pointed out that he has written many hand delivered letters to the municipality, but hasn't received a single acknowledgement. In the January KCC meeting a local environmental champion complained that she had written four letters in September and October last year to the Department of Environmental Health and the Infrastructure Department about a sump system problem in Lavender valley but hadn't received any response. Frustration was also expressed at the fact that the municipality had not acknowledged receipt of or provided feedback to an extensively complied document on the condition of Makana's rivers written by the photographic point monitoring KCC task team (2007). Another local environmental activist (KCC Jan 2008 minutes) has repeatedly tried to contact the Building Inspector, Mr Clive Christian (046-603 6166), and the Town Planner, Mr Renier van der Merwe (046-603 6069) about the effects of a recent car wash development on water. Clive and Renier do not reply to emails and when she calls she always gets an automated answer: "*this is the voicemail box of extension [number]. Thank you, good bye*" and then gets cut off. This is a new, ineffective municipal phone system.

An interview with a key informant revealed a number of constraints councillors face when communicating with the public. The main issue is that they only have one computer between them and check their emails infrequently.

4.5.2 Partnerships

There is much scope for valuable partnerships between the municipality and various NGOs and volunteer groups. This is supported by the current Director of Community and Social Services. He stated that there are many volunteer groups but they are working in isolation as there is a lack of confidence in the municipality. This is unfortunate as the municipality is there to facilitate, where they are a medium through which many things can happen. He pointed out this is their constitutional role. The municipality thus "welcome(s) joint venture aimed at bettering the lives of our people" (Mr Planga pers.comm., 2007).

Makana Municipality has a number of volunteer or NGO groups who have started meeting quarterly under the umbrella of the Makana Environmental Forum which provides a platform to share interests and consolidate projects so that groups don't work in isolation. This meeting is chaired by Makana Municipality assistant Director of Parks, Forests & Recreation and Director of Community and Social Services although the value of an environmental manager to drive the process was clearly stated by the Director of Community and Social Services. Groups participating include amongst others the following:

- Kowie Catchment Campaign (KCC).
- Vukani Greenbelt.
- LEAP Phase II.
- Southern Commonage Conservancy. This includes the Working for Water programme, preservation of natural forest, and tourism initiatives.
- Millennium Tree Planting Project.
- Siyacoca pilot project where the community assist in weekly rubbish collection.

Other external environmental/ water related initiatives where Makana Municipality are involved include:

- Makana Wide Integrated Waste Management Project. Composting, recycling and cleanup.
- Makana Aids Garden of Remembrance.
- Cleanest Town Initiative.
- Fort Brown Agri Village.
- ECCA and Blaauwkrantz Nature Reserves.
- Horticultural Project, sponsored by DEAT and South Africa National Biodiversity Institute to assist in greening Makana. This is linked to the Vukani Greenbelt project.
- Kaolin Mining Project.
- Working for Water (WFW).

These groups represent a comprehensive cross section of Makana and are potential contributors to an IWRM initiative. The role of stakeholders is, therefore, crucial as 'partners' in supporting Makana Municipality in fulfilling their service provision mandates. Presently the chair of the Forum does not have the time to personally assist in co-ordination, motivation, fundraising and finding common ground for NGOs to work together. The value of the post of an Environmental Manager, based within Makana Municipality and facilitating these campaigns, can be seen, as will be discussed shortly.

4.5.3 Community activists and watch dogs

There are a number of citizens and groups who play an active role in championing positive environmental stewardship. This section briefly describes two main groups/ projects that have positive

effects on Makana's water resources, namely Makana Enviro-News and the KCC. Groups directly involved in solid waste were mentioned in an earlier section.

Makana Enviro-News is headed up by a few environmental activists who send out a request fortnightly asking environmentally conscious people for any news and views on local environmental concerns and projects which are published in Grocotts Mail, Grahamstown's local newspaper. Water related articles that appeared in Grocotts Mail at the end of 2007, included "Resident fights for weeks to get clean water and wins" (Kwanele Butana, 11 Dec), "We still need answers" (Helen James, 18 Dec), and "Is Makana Water safe to drink?" (Luvuyo Mjekula, 21 Dec). The 51st ME-News column – which should have appeared on 29 January – provides an overview of recognised 'special' environmental days for 2008. The regular input and response from readership indicates that through this column residents of Grahamstown are becoming increasingly aware of the importance of environmental issues.

The KCC is a community volunteer / environmental lobby group that are very active in both supporting the municipality and holding them accountable for socially and environmentally responsible service provision and encouraging citizens to become environmental champions in their area, particularly through adopting a stretch of river. General aims of the KCC are to:
• "raise awareness throughout the Makana community;
• learn about the importance of fresh water both to our community and to our environment;
• research the state of health of the Kowie River System, beginning in Grahamstown;
• publicize the importance of the river's health and our right to a healthy environment and
• encourage our community to share responsibility in keeping our river healthy" (KCC webpage).
"The KCC provides support to its champions in the form of a network of expertise, educational materials, and credibility" (KCC webpage)

Monthly meetings are held where participants report back on various projects they are involved in and problems that have been noted such as sewage leaks, litter and unresponsive municipal officials. This group is also involved in organised clean-ups, involving school groups in Water Audits, teaching children how to measure and record water quality and developing water related resource materials. Various members are particularly active in a watch dog role. See appendix 2 for an example of a letter written to the town planner from one of the members that demonstrates this. The same member had a look at the water test results in the City Engineers office and followed up by contacting the Director of Water & Sewage, Mr Dabula Njilo telephonically and electronically. On behalf of the KCC she requested that there be "(i) more frequent water tests, (ii) better municipal communication, so that (iii) the public is kept informed, and ultimately, (iv) drinking water quality that is acceptable for lifetime consumption." Another two members took photos of a recent soil dump close within the riparian zone and wrote a letter to the town planner asking him "what his position is on landfill sites near rivers?"

In 2007 the KCC were nominated for a citizen of the year award which is the first time a group, rather than an individual has been nominated. This demonstrates the influence this group is having and as one member wrote after this nomination: "I think our efforts are slowly filtering further and further into the community's consciousness. And I think that this will help promote wider citizen engagement and ultimately more socially and environmentally responsible behaviour. This means a cleaner, healthier Kowie catchment!"

4.5.4 Negative citizen behaviour

While some local citizens actively champion positive environmental stewardship, the majority do not engage in participatory environmental management and actually contribute to the degradation of river systems and municipal environmental water quality through habitual littering, illegal dumping and blocking of toilets and storm water drains. The behaviour and attitudes of Makana residents is an issue which negatively impacts the Local Authorities' ability to fulfil its functions effectively and efficiently. For instance, the mandate of Environmental Health does not extend to policing and cleaning up illegal dumping or littering, but the limited municipal cleansing resources are diverted from functional responsibilities to deal with illegal dumping in the interests of public health. The provision of community garden refuse facilities is also abused by individuals dumping domestic refuse or depositing refuse outside of the facility (skip/container/site). Non-payment for services clearly threatens financial viability and the ability to provide sustainable and reliable municipal services.

The general response in a questionnaire filled out by a number of councillors is that irresponsible behaviour from public and officials is a real problem. This includes:

- Taps left running.
- Faults & leaks are not reported.
- There is a poor attitude to recycling.
- Citizens are uneducated about the cost of water service delivery (service payment levels are poor and up to 25% of water is unaccounted for).
- Apathetic public who do not attend public meetings or ward meetings.
- Escalation in water consumption as water borne sewerage is increasingly available to all. However, this has not been coupled with proper household management of these systems due to a lack of education.

4.6 Environmental Manager

As an attempt at creating a structure for environmental issues to be handled within Makana, the LEAP (2004) project proposed the creation of an Environmental Manager post within the structure of the municipality. This is a strategic post providing environmental leadership to the Municipality and the community, and its possible placement within the Manager's Office is being considered by Makana Municipality. The value of such a post to Makana in IWRM implementation is clear as the incumbent has to:

- Assist with the vision of Makana, comply with legislative obligations and generate awareness of water resource issues related to water service provision and land use management, linked to economic development.
- Ensure and co-ordinate full integration of environmental considerations, protocols and best practice into all municipal activities.
- Support, in particular, the Departments of Environmental Health, and Parks, Forests and Recreation in the fulfilment of their statutory environmental responsibilities, including *inter alia* monitoring of pollution, waste management, and biodiversity conservation, and enforcement of environmental legislation within their areas of competence.

The environmental officer would be able to interact with all the other environmental bodies and keep an eye on EIAs for developments and motivate workers and managers in several departments to be more aware of environmental impacts. This position would also bolster an under capacitated municipality; enable them to develop and be proactive about a greening vision; include the impact of water into all development decisions; and align and integrate the many organizations and NGOs that are concerned in

some way with IWRM so that their work is optimized. The importance of this position is supported by a range of stakeholders from councillors, officials, researchers, NGOs and volunteer groups.

The appointment of an environmental manager is thus very important for IWRM is to be achieved in Makana. As Mr Planga explained (Director of Community and Social Services) currently environmental issues tend to be relegated yet they cut across departments. His vision is for this post to be located with the municipal manager as s/he should have an oversight role. This view has been encouraged by experts who recommend that this post be a high position job placed in a strategic role with access to all directorates and linkage with all organizations. It should be a one stop shop for all environmental issues that is able to access funds for environmental concerns. The municipality agree that such a role is necessary and they have currently made some provision for the position to be housed in the department of Community and Social Services.

Since the LEAP project of 2004 identified the value of such a post public opinion is marshalling behind this idea, as indicated in a recent article (June 19th, 2007) in Grocotts Mail, Grahamstown's local newspaper titled *"Municipality ignores Environment – AGAIN?"* The article said *"The municipal manager has enjoyed another salary hike (the increase alone the equivalent of a senior university lecturer's entire salary), and there appear to be plans to establish another two high-paying posts, namely Chief Operations Officer and the even more vaguely-termed Local Economic Development post. The post for an Environmental Officer has once again been pushed to the back of the queue…. In the past, the excuse was that there were insufficient funds to pay for an environmental officer. This is clearly not the case. Is there no awareness in our municipal structures that absolutely everything – including much-needed economic development – is dependent on safe, clean, productive environmental conditions? To give just one example: the push to install water-borne sewerage in new housing is job creating, healthy and apparently progressive – but what happens when the water shortages hit us, as they inevitably will? An environmental officer would be able to put such projects into the context of the bigger picture and suggest more sustainable alternatives."*

4.7 Summary

In the Grahamstown situation a number of problems are evident:

1. A number of environmental problems are caused by the local population, either due to poor attitudes, lack of responsibility and/or lack of knowledge. These problems include
    - extensive littering
    - blocking of toilets
    - poor attendance at public meetings
    - wastage of water
    - poor payment of services
2. Poor operation and maintenance of ageing infrastructure with common occurrences of water and sewage leaks, and pipe breakages cause muddy drinking water which are regularly reported problems in some homes. The water crises in 2006, where people were without water for over a week indicates the extent of the problem. This crisis was a result of poor operation and maintenance, and break down of pumps.
3. There are many sewage leaks that have been occurring for a number of years. This has a positive feedback where people become disassociated from the river. Rivers become litter dumping grounds.

4. Citizens are increasingly complaining about the taste of the water due to its high chlorine content, sometimes muddy appearance and taste of algae.
5. An historical analysis of Grahamstown's water supply indicates that throughout our history there have always been problems of an insufficient water supply. We currently get a lot of our water from the Orange River through the inter-basin water transfer scheme.
6. A variety of monitoring results indicate that the river water is of a poor to fair quality depending on how far it is from Grahamstown and its sewage works.
7. There is poor communication between the municipality and citizens which causes much frustration among the population and also undermines the potential collaboration between the municipality and volunteer groups working towards the betterment of the environment.
8. There is much need and impetus for an environmental manager to be appointed. The municipality seem to be addressing this issue.

CHAPTER FIVE

5. INTERGOVERNMENTAL RELATIONS IN THE WATER SERVICES SECTOR: RESEARCH PROJECT NO K8/752 By Atkinson & Mccann.

5.1 Intergovernmental support for the water services sector

The "concept of cooperative governance embraces the realisation that a single sphere of government cannot handle the responsibility of a developmental state…and that not one sphere can be successful without the successful performance of the other spheres" (DPLG, 2006). Cooperative governance and intergovernmental support are essential if the water services sector, and water services authorities (WSAs) such as the Makana and Cacadu municipalities, are to effectively and efficiently plan, develop, monitor and manage water services, including water resources and services infrastructure.

In terms of Section 154 of the Constitution, national and provincial governments are responsible for building the capacity of municipalities. The term "capacity-building" is an abstract and vague one, and needs to be given content. All capacity-building initiatives have to be contextually appropriate, and this will differ from one municipality to the next; but it is more complicated than that. "Training and education is only one factor in building capacity – building capacity includes other factors, such as the ability to access funding, technology, administrative resources, equipment, information, support and collaborative partnerships. The co-ordination of existing resources and competencies and the management of information are key roles that coordinating bodies such as national departments, provinces and district councils should undertake. Without the accompaniment of these factors, training and education…may only frustrate" (WRC, 2000). This sentiment is echoed by interviewees, where the principal call emerges for an assessment or re-evaluation of the skills and skills gaps that exist alongside such issues as appropriate placement and effective recruitment and training.

This section looks briefly at the challenge of intergovernmental support and the potential role of a district municipality in supporting a local municipality before exploring the questions of intergovernmental support, particularly from provincial and national government, for water services and for Integrated Water Resource Management (IWRM), specifically in terms of the formulation of IWRMPs. Two lines of inquiry inform this section of the report:

(1) To what extent do provincial and national departments provide general support for water services management? These are more general and ongoing types of support.
(2) To what extent do / will provincial and national departments provide the type and level of support to municipalities, as envisaged in the IWRM Guidelines, which are aimed at compiling a municipal IWRM Plan? These are very specific and technical types of support.

5.1.1 The challenge of intergovernmental support

The Makana and Cacadu IDPs have been formulated within the broader National and Provincial policy and planning frameworks and there is a degree of synergy between the Local and District IDPs. A key limitation identified in the formulation of the IDPs is the lack of support, in terms of contribution to the planning process and content, from Provincial, District and sectoral departments. The concept of

intergovernmental relations (IGR) appears to have remained conceptual in that details of projects and programmes being undertaken by public institutions beyond the municipalities have not been forthcoming. This situation translates into duplication and uncoordinated development, where major infrastructural investment (such as roads, clinics and schools) takes place within the municipal boundaries which is not effectively planned for, but must be accommodated into future servicing and maintenance plans. A further concern relating to IDPs, raised by a DWAF respondent, is that local municipalities are not truly appreciating IDPs, which should integrate and cover all aspects of development, such that Local Municipalities (LM) deal only with "what they know" and overlook development aspects which directly impact upon them – notably Water Resource Management (WRM) – to be dealt with by district municipalities.

The District IDP is well integrated and comprehensive, including substantial overviews of required cross-sectoral, managerial and sector programmes, notably the WSDP and IWMP. The Makana IDP was drafted prior to its WSDP and does not provide significant insight into environmental and water resource management issues. Local capacity limitations are identified to some extent, but the WSDP provides a more thorough analysis of particular challenges and constraints, coupled with fairly detailed recommendations and required interventions. Both municipalities completed their IDPs in-house, while their WSDPs were outsourced to the same service provider which has fostered a high degree of consistency as well as cost-effectiveness. However, it is reported by respondents that a key limitation to the planning process, contributing to gaps in information and to unrealistic expectations from implementation, is that Intergovernmental Relations (IGR) is lacking in that district and provincial departments, in particular, do not effectively participate in and contribute to the process.

According to the Cacadu WSA Manager and several DWAF respondents, the Cacadu District Municipality (DM) does play a key role in supporting local municipalities by assisting in the formulation of policies, by-laws, section 78 / service delivery agreement assessments, and plans, such as the WSDP and IDP as well as O&M and "As-Built" Plans. A limiting factor on effective planning is that plans are typically regarded as "soft" projects, which attract limited resources compared with "hard" (infrastructural/engineering) projects, yet demand considerable time and human resources. Another concern, particularly around WSDPs, is that resources are directed more towards auditing than to assisting in the effective completion of planning interventions.

The section 78 process holds great potential for critical reflection on the most appropriate means for providing services, specifically in terms of the WSP function which demands preventative maintenance and ongoing O&M. An urgent need has been identified for re-evaluating the capacity and performance of LMs against powers and functions to determine what interventions are required to effectively fulfil the function. A response could include the development, overhaul or revision of recruitment, retention and skills development policies and plans. The latter could result in targeted training courses for existing staff or it could result in targeted recruitment of new skills.

In response to high staff turnover[5] in critical posts within the water services sector and to identified skills requirements in both WSAs and the DWAF Regional Office, the "Strategy for Retention and Development of Key Staff in the Water Services Sector in the Eastern Cape" (DWAF, August 2006)

[5] Staff turnover in the water services sector, from 2003 to 2006 against the total 2006 staff complement, averages 17% for the Province; the average for Makana is 22%. The principal driver of staff turnover in the Municipality is retirement at pension age (80% - 8 of 10), with early retirement and dismissal accounting for the remaining two departures in Makana.

was developed. The Strategy argues for a review of the organisational structure of WSAs to allow for increased personnel where training and 'up-skilling' of existing staff members is unlikely to address the skills-related challenges. Recommendations relating to intergovernmental support of WSAs include that the capacity of provincial portfolio committees be developed, particularly in organisational performance management (notably monitoring and evaluation) and that professional change management agents are critical to the effective and efficient development and implementation of functional organisational structures. The implementation schedule of the Strategy itemises five high priority objectives in the WSAs Implementation Plan, tabulated below (Table 6.1).

Table 5.1. Staff Retention Strategy in WSAs Implementation Plan		
OBJECTIVES & DELIVERABLES	**RESPONSIBILITY**	**TIME FRAME**
1. Provide structured support for change management and finalization of organizational structures in WSAs as per the Section 78 requirements		
Service provider/change management specialist appointed to assist selected WSAs to effectively manage their restructuring process. New Organisational Structures of WSAs finalized and approved, including job descriptions and evaluations. New organizational structures of WSAs successfully populated (recruitment and placement of staff).	DWAF & WSAs	2007
2. To address salary disparities amongst the various WSAs		
Situational Analysis Report on the salary packages of WSAs in the Eastern Cape. Proposals to address the disparities.	DHLGTA **SALGA & LGBC** DWAF EC & WSAs	2008
3. To develop incentives to attract and retain key personnel in rural WSAs		
Staff Retention Incentive Scheme for Rural Areas developed and approved. WSAs to benefit from the scheme successfully identified and agreed to.	DHLGTA **SALGA & LGBC** **DWAF EC** & WSAs	2006
4. To review salary bands at non-managerial occupational categories to allow for progression within the same occupational category		
A salary structure with notches (similar to the Public Service Structure) is developed, approved by Bargaining Council and implemented. SALGA and Local Government Bargaining Council are co-drivers of this process.	DHLGTA **SALGA & LGBC** DWAF EC & WSAs	2007
5. Prioritisation of health and safety measures and regulatory compliance		
Generic policy on Occupational Health & Safety Policy for WSAs developed. All WSAs have developed and adopt their Occupational Health & Safety Policy. Comprehensive audit of all WSAs for NOSA Compliance All WSAs assisted to be NOSA compliant (Water Services)	DWAF EC & WSAs	2006 Ongoing Monthly

Source : DWAF (August 2006)

Objective 1 – structured support change management – is of particular relevance for this study and there has been limited progress towards realising the first deliverable in that the terms of reference are in place, and due to be advertised, for a Section 78 assessment service provider to identify skills gaps and requirements, training needs and organisational restructuring objectives and proposals. This process is being driven by DWAF and, in the case of Makana, the Cacadu District Municipality (DM). As noted earlier in this report (see section 3.1), the Cacadu DM is supporting its family of LMs, including Makana, with such requirements as WSDPs and Section 78 processes and arrangements. Considerable savings were generated for LMs in drafting the WSDPs and a similar process will be undertaken for the section 78 assessments – that is, a group of WSAs will be serviced by a single service provider,

responding to a single brief but developing individual reports for each participating WSA. Makana has opted for this grouped approach, together with three of the other eight WSAs[6].

District municipalities are potentially very important support agencies for municipalities. Their developmental role could include the following kinds of initiatives:

- Providing project management for district-wide projects.
- Providing technical skills – employment of specialist staff (e.g. engineers), on behalf of all Category B (local) municipalities in the district.
- Promoting intergovernmental relations.
- Capacity-building of Category Bs, e.g. design organograms, financial systems, IT, and performance management systems.
- Providing specialist advice.
- Providing policy-making support for economic and social development.
- Promoting shared services amongst LMs.
- Prioritising of capital development needs according to district-wide needs.
- Monitoring and evaluation of development and trouble-shooting.

Considering the Cacadu DM against the potential developmental roles listed above it must first be reiterated that the District's WSA branch is currently staffed by only one official – the WSA Engineer – who is also responsible for ensuring that WSA and WSP functions are fulfilled on behalf of the DMA. The District operates with a fraction of the personnel (less than one quarter) and financial resources (less than one tenth) that once served the region prior to the demarcation of the Nelson Mandela Metropolitan Municipality. In addition, many critical skills, notably engineers, have left the District, being faced by substantial wage-cuts (up to around 40%) against more attractive 'packages', and skilled staff replacements are extremely difficult to draw and retain.

District-wide project management and policy-making support extended through grouped projects such as in the formulation of WSDPs, Section 78 assessments and by-laws. The possibility of employing specialist staff for deployment across all WSAs of the District is not seen to be feasible, given the vast size of the District, but could be achieved through specialist advice from District level and through sub-areas (grouping WSAs) where specialist skills could be shared. Such arrangements would require cooperation from provincial and national players, particularly in respect of funding functions.

A critical obstacle to prioritisation that is commonly raised, for local and provincial spheres, is that of political interference: Even where priority rating systems have been implemented, to rank those areas and projects that most need resources and development intervention, the resultant priorities or rankings of projects have not been given political support. It is an unfortunate truth that the interference of parochial and political interests does tend to undermine the very best of plans. Political interference is raised as a concern by virtually all respondents, where it negatively impacts on monitoring and performance management, prioritisation and budgeting, notably for O&M, staff retention and working conditions, as well as staff appointments. IWRM is also identified as destined to fail through political

[6] A concern noted amongst participating WSAs, specifically Makana, is that this broad-based or grouped approach to completing WSDPs and Section 78 assessments detracts from local 'ownership' and uniqueness. The major advantage to this approach is the savings in terms of both financial costs and human resources, particularly for service provider oversight. The principal disadvantage is that the degree of uniqueness and ownership depends on each WSA's level of commitment and contribution, and hence local skills and capacity, to engage in processes that will result in individual end products.

interference since politicians opt for ‘quick wins’ rather than strategic long-term goals that may only bear fruit beyond their terms of office.

The Cacadu DM has initiated information-sharing sessions aimed at the cross-pollination of skills and experiences in the water sector. These sessions draw on the strength of resources and experiences of the Metro and further aims to promote shared support and skills as well as cost-savings by partnering with the Metro in, for instance, bulk purchases (e.g. technical infrastructure, spare parts, instrumentation, materials) and for technical assistance (e.g. laboratory testing). The Metro extended assistance in the WSDP preparation process particularly in terms of implementation and maintenance expertise. It is anticipated that further information-sharing and expertise will benefit all WSAs of the District through further sessions targeting such key issues as record-keeping and monitoring and evaluation, as well as further assistance with operations and maintenance.

The District does fulfil a limited monitoring function by assessing expenditure of local municipalities against the MIG allocation and, where blockages or problems are identified, offering assistance to municipalities in finding solutions. Makana is one of two municipalities in Cacadu that were identified as not spending their MIG allocations. However, in response to queries and offers of support, the Local Municipality reportedly stated that no problem existed. A noteworthy observation by the District is that, even while it functions to support its family of local municipalities, there is no hierarchy (the District and all LMs are WSAs) and the District therefore has no authority to intervene.

Makana Municipality has experienced several months of sustained, predominantly negative, local media coverage to the extent that the Municipality appears to have ‘closed ranks’ and no longer makes use of the local paper for advertisements and planning notices; this has in turn generated public outcry and further negative publicity. Grocott’s Mail launched a “Get it Sorted!” column in August 2007, which is run regularly and itemises residents’ complaints and maintenance issues relating to the full range of municipal services, including the quality, supply and maintenance of water and sanitation, roads and stormwater, and electricity services along with further issues such as road signage, pavements, alien and invasive vegetation and street lighting. In addition to the issues listed in the complaints’ column, the local paper regularly features articles on solid waste problems (overwhelmingly as a result of illegal dumping), pollution (rubbish in rivers) and contamination of water systems (such as the Zionist Dam), unsafe conditions as a result of poor or incomplete infrastructural works (open drains and servitudes, bucket eradication delays), institutional capacity concerns (staff losses, communication difficulties) and political divisions.

The communication difficulties mentioned above have implications primarily for the local municipal constituency in that officials are difficult to contact and planning applications and proposed projects are not readily appreciated by reading the local paper. However, the impact is more broadly felt. In one instance a provincial official noted repeated failed attempts at contacting a municipal directorate to arrange for a meeting and ultimately travelled to Grahamstown to continue with such attempts, in person. This breakdown in communication has arguably been aggravated by negative publicity but may, strangely, have been further enabled by the implementation of an automatic call answering service and the appointment of a Communications Officer in that the obligation to answer the telephone, to meet with ‘walk-ins’ and to respond to public enquiries has been obfuscated.

5.1.2 Intergovernmental support for water services

Makana municipality is both a Water Service Authority (WSA) and Water Service Provider (WSP). The key functions of a WSA and WSP are tabulated below.

Table 5.2 Key Functions of the WSA and WSP

Key functions of the WSA	Key functions of the WSP
• Correlate the needs of communities throughout the affected area. • Ensure that communication with the community is adequate to ensure the needs of consumers are being satisfactorily met. • Draw-up a management plan to integrate the delivery of services throughout the affected area and allocate resources accordingly. • Design and implement measures required to eliminate process shortcomings. • Ensure planned maintenance is being implemented according to programme. • Ensure that plants are being operated optimally and cost-effectively. • Appoint sufficiently qualified technical and administrative staff to fulfil the supervisory function of DWAF process control requirements. • Assess analytical results to ensure plants are being efficiently operated. • Draw-up and apply standard operating procedures. • Ensure standard operating procedures are being implemented and that record-keeping is accurate and complete. • Draw-up capital and O&M budgets. • Draw-up by-laws, regulations and tariff structures. • Construct water balances throughout the affected area. • Maintain and control bulk water storage, supply and delivery. • Undertake public awareness campaigns to increase social awareness about personal hygiene, water-borne diseases and the importance of water conservation.	• Define needs of community. • Assess plant / delivery system / storage relative to needs. • Identify shortcomings in the existing plant. • Draw-up a plan and programme to eliminate shortcomings. • Design changes and estimate costs. • Implement changes required. • Develop and implement a planned maintenance programme. • Optimize treatment and investigate alternatives. • Appoint sufficient adequately qualified operating and administrative staff. • Draw-up and implement continuing training/education programmes. • Inspect, monitor and regulate the plant operation. • Appropriate sampling and analysis to assess plant loads. • Evaluate plant performance relative to load received. • Adjust operating procedures to optimize cost-effectiveness. • Develop and implement recording and reporting procedures. • Draw-up and apply standard operating procedures. • Draw-up capital and O&M budgets. • Implement by-laws and regulations. • Provide input to water balances. • Maintain water and sewerage reticulation systems, including pump stations in affected areas. Clear blockages as they occur. • Monitor and eliminate illegal discharges to sewerage system (storm water, industrial effluents, etc.). • Collect revenues according to water and sanitation tariffs.

	• Regulate industrial effluents and levy industrial effluent charges, as prescribed by the relevant Industrial Effluent by-law. • Interface with the local community on ongoing (possibly changing) needs and the availability and quality of water.

Source : DWAF, Eastern Cape (*undated*) "Draft Makana Report"

In the water sector, there are numerous ways in which WSAs can be assisted by national and provincial departments. The following capacity-building interventions may be relevant:[7]

- Provide effective policy guidance, to assist municipalities to draft policies and by-laws.
- Assist municipalities to identify potential problems, crises and disasters.
- Assist planning processes (IDP, WSDP, IWMP, IWRMP, WSA and WSP Business Plans).
- Assist municipalities to identify suitable projects, and highlight administrative requirements and hidden costs.
- Assist municipalities to secure donor and other funding.
- Assist municipalities to restructure their Head Offices in a more strategic and output-oriented way, and to locate key functions logically within developmental directorates.
- Assist municipalities to restructure the relationships between their Head Offices and outlying offices (e.g. in satellite towns) to promote local development.
- Assist municipalities to do zero-based developmental budgeting and to undertake cost specific functions realistically.
- Assist municipalities to write Operations and Maintenance Plans for infrastructure.
- Advise municipalities on conducting public participation.

In terms of water sector support, the most critical department is clearly the DWAF. The structure of the DWAF is not readily apparent and, based on respondents' feedback, remains complex even to those active in the water sector. The numerous DWAF directorates and sub-directorates are distributed across the Province. Presently the structure, in terms of directorates and physical centres, appears as follows:

- Corporate (King Williams Town – KWT),
- Finance (KWT),
- Water Sector Support (KWT),
- With sub-directorates in Mthatha and ultimately (anticipated) in Queenstown and East London,
- Institutional Establishment (East London) – dealing with CMAs and other water institutions, such as WUAs,
- Hydrology and Water Use (Cradock),
- Regulations and Water Use (East London) – dealing with licensing, investing and regulation,
- Water Resources Infrastructure Management (Port Elizabeth) – dams, canals, bulk pipelines.

In the case of Makana, there are several IGR fora where the District and local municipalities meet with DWAF and provincial departments:

1. District-wide Integrated Forum (LMs, Cacadu DM, Environmental Affairs, Public Works, Agriculture) started in 2006. It meets once every two months;

[7] HSRC, *Review of Schedules 4 and 5*, unpublished report for DPLG, May 2004.

2. Bi-lateral meetings are held quarterly with DWAF and Cacadu DM in Port Elizabeth. Ideally bi-lateral meetings will be convened with each WSA, but currently this is a grouped-WSA meeting and may be organised into smaller WSA groups in the near future;
3. Eastern Cape Water User Association Committee (ECWUAC is a provincial forum which ideally includes all WSAs, Education, Health – clinics and SALGA) meets quarterly or as needed in East London (top management forum, decision-making meeting with DWAF, municipalities and councillors);
4. WAFCOC is an executive-type level provincial water committee (formerly the Integrated Water Services Development Forum) that typically holds quarterly, to bi-monthly meetings, which makes recommendations;
5. Technical Committee operates below WAFCOC and produces 3-monthly reports;
6. Task Teams (monthly / regular): the list of task teams is extensive and these institutions are organised on an *ad hoc* basis and are expected to remain in place until specific identified areas of needs are addressed. Currently organised task teams are as follows:
    - Drinking Water Quality (key team identified by Cacadu-Makana);
    - Backlog (Project Management Unit-type) (key team identified by Cacadu-Makana);
    - Revenue Management (key team identified by Cacadu-Makana);
    - Infrastructure Asset Management;
    - Provincial Sanitation;
    - Geographic Information System (GIS);
    - Special Programme (gender, civil society, organisations);
    - Staff Development and Retention (key team identified by Cacadu-Makana).
7. Environmental Health Directorate meetings (regular): includes all relevant local bodies (Fire; Traffic; Parks and Recreation; Libraries; Private Health sector) to identify and act on any health-related problems (e.g. sewerage, solid waste);
8. IDP Steering Committee meetings – should include representatives from all departments;

This suggests that the institutional framework for municipal support is being created. However, we need to inquire about the specific nature of this support. Accordingly, key issues and development challenges facing Makana have been identified, within four broad areas relating to the water services sector, namely: Waste management; Sanitation; Household Water Supply and Water Catchments. Many of the key issues identified have been discussed substantially in earlier deliverables of the IWR-WRC research project (K5/1688) – "The Development of a Framework for the Involvement of Local Government in Water Resource Management, Linked to Water Service Provision". As such, the four areas and key issues are reflected upon briefly, drawing on results from interviews and secondary research as well as on the findings of the aforementioned IWR-WRC research project.

Overarching concerns which speak to all aforementioned areas are monitoring, O&M and human resource capacity. In respect of the latter, the water sector is reported to receive marginal training support – in the past three years only one technical services officer has undergone training, while training received by technical staff a decade ago is no longer appropriate due to technological changes and advances. Training has been identified by Makana as one of the key concerns with DWAF and funding has been allocated for the completion of business plans (which identify capacity building needs) as well as for training of water services and waste water operators, specifically senior foremen and plumbers. DWAF implemented a three-year training programme towards the end of 2007 to respond to identified issues, including an aging workforce and under-qualified staff. Challenges to skills development include that training is often not enough to effectively build capacity (although it is

acknowledged as a 'good start') and must be coupled with interventions such as coaching and mentoring, and that limited staff resources mean that on-site training is required since staff cannot absent themselves from work to attend training courses.

In terms of O&M, there is little to no budget provision. Even if provision is reflected on paper, actual money is reportedly not available and funding reserves for maintenance have been depleted. Furthermore, no system is entrenched to follow up on actual expenditure against on-paper budgeted O&M. Old infrastructure is not regularly maintained, resulting in infrastructure failings and crisis management as well as loss of revenue through unrecorded water use (old and failing water meters, illegal bypassing and connections) as well as through water losses (around 35% and more across the District). Monitoring and record-keeping are also reportedly non-existent or, where records are kept, information is not readily accessible or useable owing to the manner in which data is stored (i.e. in PDF rather than spreadsheet format). The District is responding to the need for improved record-keeping, principally through information-sharing sessions, but much remains to be done at the local level in terms of re-evaluating and prioritising human and financial resource allocation to identify and tackle problems (as opposed to crisis management which deals with symptoms only) and to ensure preventative maintenance and ongoing O&M. It is anticipated that the section 78 and business planning[8] processes will identify gaps and needs as well as a way forward in tackling capacity, monitoring and O&M concerns.

5.1.2.1 Waste Management

The two local issues facing Makana in respect of waste management are: littering; and solid waste removal and management. These interrelated issues have been identified as key local problem areas facing Makana, water services and resource management as well as environmental health management. As noted earlier (see Section 2), municipalities are required, in terms of the NEMA, to complete an Integrated Waste Management Plan (IWMP) as part of the IDP process. However, the IWMP and other key cross-sectoral plans of the IDP, such as the WSDP, are associated with critical problems, such as being completed merely for the sake of compliance and for having IWRM gaps which should be addressed by the comprehensive IWRMP.

As noted previously (see Section 3.1), the Environmental Health and Cleansing Directorate serving Makana is part of the District structure and its responsibilities include domestic refuse collection, provision of suitable garden and rubble refuse facilities as well as suitable landfill sites, cleaning of the central business district streets and of public toilets. Over and above its responsibilities, the cleansing department issues black refuse bags to Grahamstown North and East households and to businesses and has further met with municipal wards, via councillors, to identify 52 garden refuse dumping spots or facilities which are now provided and, as far as possible, serviced – although this servicing is not described as consistent or regular. Problems are seen to arise overwhelmingly from abuse of services and facilities – bin bags are not used as intended and refuse is dumped illegally (including in bushes and rivers); garden refuse is not disposed of in the facilities provided around it; domestic and business refuse is dumped in and around sites intended for garden refuse; animals (donkeys, dogs, goats) are not controlled and tear open bin bags, contributing to the litter problem; people going through bin bags do not replace unwanted refuse in the bags or do not properly re-secure bags (this is apparently aggravated where residents chase garbage-pickers away, resulting in bags being removed to a secluded and unserviced spot). The resultant litter problem is further aggravated by natural forces (wind and rain)

[8] The Makana WSA and WSP Business Plans have reportedly been approved by Council but are not yet readily available.

distributing litter across the land, depositing it in natural and artificial (including stormwater) water courses which in turn contribute to blockages in systems and to pollution of the catchment area.

The resources (human, financial, equipment) and mandate of the Cleansing department do not extend to tackling illegal dumping, although resources do sometimes have to be diverted towards cleaning up illegal dump sites where a health hazard is identified. The Cleansing department recently announced that it will be imposing a fine of R188 for non-compliance with municipal refuse collection times and noted that, in spite of facilities being provided and of notices prohibiting littering, illegal dumping by residents and businesses fuels the 'ongoing refuse saga' (Hans, 2008).

Environmental Health is now working with the Police Services in an attempt to curb illegal dumping and offenders can be reported to the department and prosecuted on behalf of the Council using Makana's by-laws. In addition, the department works with Correctional Services where the latter assists with cleansing over busy periods (Festival times) and, from October 2007, makes prison labour available for four hours each Saturday to clear problem areas, such as water courses and roads. Various education and environmental awareness campaigns have been undertaken, with very limited success, targeting responsible solid waste disposal and waste management. One such initiative with departmental support is a solid waste recycling initiative sponsored by DEAT Poverty Alleviation Programme. Other local initiatives include: the Kowie Catchment Campaign (KCC) – a volunteer community and environmental health initiative that aims to campaign, educate and actively keep the Kowie system clean; the short-term (3 month) Tantyi Project, a community-based project employing casual labour to clean streets and clear refuse from the Tantyi suburb which did not result in any positive longer term effects; and the medium-term (3 year) Siyaxuka waste management / education project - or Siyacoca residents' initiative – encompassing ward, street and house-to-house drives targeting education and awareness (including promoting composting), which is also reported as having little, if any, impact on solid waste management attitudes and behaviour. On a positive note, the local paper has run several awareness spreads on recycling and responsible waste disposal, covering recycling and collection businesses and reporting on dumping facilities available in Grahamstown.

A key solution to solid waste problems is identified as cooperation from businesses and community support – including control of domestic animals and legal dumping. At the operational level, support is required in equipping the Cleansing department with more vehicles to fulfil their servicing mandate; in particular, the heavy-duty tractor used to pull skip trailers is in need of replacement (the current tractor is described as being 35 years old, with a seized engine). Institutionally, vacancies need to be filled more efficiently (current replacement time averages one year) and should proceed with the involvement of Environmental Health and Cleansing officials and without political interference; and on-site training should be undertaken following an identification of existing skills and gaps.

5.1.2.2 Sanitation

The key local issues facing Makana in respect of sanitation are the provision of toilets and the maintenance of sewerage systems, including bulk (e.g. oxidation ponds) and reticulation infrastructure. As noted earlier in this section, O&M is an overarching concern and is particularly appropriate to sanitation issues where poor maintenance has severe ramifications in respect of resource contamination and public health. However, the lack of O&M budget provisions for bulk and reticulation sewerage infrastructure is highlighted as a critical issue facing Makana. A further identified issue is the lack of awareness and effective education associated with new sanitation flush systems (waterborne or septic

tank) resulting in failed or blocked toilets as well as in reticulation blockages and associated overflows of sewerage.

Makana plans to eradicate the bucket system this year (2008), with the support of National DWAF, and to extend flush septic tank and waterborne sanitation systems throughout the Municipality. Delays in eradicating the bucket system have resulted through labour disputes associated with reported delays in payments from the Municipality. The replacement of bucket latrines has also met with opposition from residents in terms of the manner in which it has been implemented – where substantive consultation and consideration for residents' property have been indicated as lacking (for instance, one resident's prized rose garden was destroyed while laying the pipeline in spite of a suitable, non-destructive route having earlier been identified). Furthermore, where new flush systems have been installed, toilets have become dysfunctional within a short space of time owing to the lack of associated education on how to use (or not to use) the new system – for instance, newspaper and the use of the system for disposing of rubbish leads to blockages.

A further sanitation problem in Makana is identified in relation to pit latrines, specifically in Grahamstown's higher density settlement of eRini, where overflows into nearby watercourses occur during wet weather owing to an underlying clay layer which causes subsurface inflow to the pits. A potential solution to this environmental consideration has been presented by a piloted waterless sanitation system installed by an eRini private pre-school. Further afield, Buffalo City Municipality's Integrated Environmental Unit has implemented an alternative sanitation education and awareness drive, which may reveal further sustainable sanitation options that could be pursued by Makana if it were to consider alternatives to its targeted full waterborne sanitation level of servicing.

A factor to be considered in service level targets, identified in the Makana WSDP, is to promote the efficient use of water particularly where targets may exceed water available. Accordingly, a water conservation / demand management (WC/WDM) strategy is required in terms of the National Water Audit to "enhance the management of water services in order to achieve sustainable, efficient and 100 percent affordable services to all consumers" (Makana WSDP, 2007). WRM interventions that should be undertaken by Makana to incorporate WC/WDM into their sanitation service delivery programme include, amongst others, to limit all cisterns to 6 litres, to retrofit all existing toilets with dual flush mechanisms and to replace all traditional valves in toilet cisterns with siphon box type flush mechanisms. It is most unfortunate that these interventions have not been applied in the process of extending full sanitation services in the Municipality. As such, the job of installing new toilets will need to be revisited, translating into considerable, and unnecessary, wastage of resources.

5.1.2.3 Household Water Supply

In terms of this area of concern, several key issues are identified, including maintenance of bulk water supply and reticulation infrastructure, demand management and credit control, as well as the Municipality's indigent policy and free basic services. Again, O&M is an overarching concern where infrastructure (bulk and reticulation) is described as 'poor' and 'old'. Bulk water supply infrastructure is identified as being in need of overhaul or replacement while two bulk water supply reservoirs were 'completely lost' in 2007 due to human (technical staff) error. The reticulation system is maintained only through 'crisis management' where the lack of O&M budget provision does not allow for the required systematic piping replacement coupled with meter replacements and monitoring. As noted earlier, water and service revenue is lost through illegal bypassing and connections, described as 'clever' theft – losses were estimated at 15.5% for Makana in mid-2007.

The Municipality applies an undifferentiated tariff rating for purified water, that is, there is no rising block tariff system and the same unit rate is applied regardless of consumption. A DWAF-supported study was undertaken to calculate and pilot a block tariff but no agreement could be reached on a fair means to implement the system in Makana. This process could be reattempted in line with a future demand management strategy. The Municipality does not currently have an Education and Awareness Programme relating to sanitation and water (including water conservation), but is confident that this will be realised within five years (Makana WSDP, 2007).

WC/WDM has yet to be comprehensively tackled by Makana. A key limitation to effective WC/WDM is arguably marginal maintenance as well as record-keeping and monitoring capacity. Credible and developmental local government should lead by example – which is not applicable to a municipality that appears unable, or unwilling, to conserve water resulting from lack of maintenance and responsive remedial action. One initiative has been identified as an attempt to promote responsible use of water and associated user-maintenance of sanitation and communal water infrastructure, namely Project Masakhane. The latter campaign was initiated in 2002, with funding in the order of R0.75 m, targeting education on basic toilet and communal water infrastructure maintenance, but reportedly failed due to economic motivations (selling parts being more lucrative rather than using them or fixing problems). One respondent expressed the opinion that free servicing and supply (e.g. public standpipes) tends to equate to no payment and no responsibility, which results in wastage. This concern is not unfounded and needs to be addressed as a component of Makana's Education and Awareness Programme.

Currently, cost recovery for water sales is very poor, second only to rates collection[9], and government institutions are one of the biggest defaulters. In an attempt to improve payments for services the Municipality has introduced a new policy where a debtor's electricity will be disconnected in the event of outstanding debts. A comparable strategy was implemented by the Cape Town Metro, but instead of power disconnections prompting back-payments for service delivery, government departments invested in generators. While a simplistic view of support from provincial and national government, lack of payment for services is a critical failing which undermines local capacity and offers a bad example which may readily be followed by local consumers.

Makana does have an indigent policy in place which is regarded as being effectively implemented. Several drives to register indigent households have been undertaken and confidence has been expressed that virtually all indigent households[10] are registered. Registered indigent households are supplied with 'free' water up to 6 kilolitres, which is covered by the Municipality's equitable share. If water use exceeds the indigent allowance (6 kl), then it is billed and such service charges typically contribute to the outstanding debtor balance. Makana is one of few municipalities to use equitable share for nothing but costs associated with their indigent policy, and where there is a surplus it is used to write off debts generated by indigent households as well as those households seeking registration as indigent. This budgetary arrangement is not ideal as a portion of equitable share should go towards O&M.

5.1.2.4 Water Catchments

Management of water sources is the key issue within the water catchments area of concern and is identified as 'poor', largely due to related solid waste management problems. Several initiatives respond to this issue, including the local KCC and Makana Environmental Forum together with the

[9] Rates collection averages 1,066 days, followed by water (789 days) then electricity (72 days) sales. Outstanding water charges amount to over R20.29m owed by 16,565 debtors.

[10] Households classed as indigent have a monthly household income of up to twice the monthly state pension.

national/provincial Working for Water (WFW) programme. According to DWAF (*pers.comms.* December 2007), local municipalities are responsible for the land within their area of jurisdiction and are accordingly responsible for managing their water catchment areas. Interconnected management responsibilities, which underscore the extremely important role of local water services managers, are identified to include stormwater, solid waste and sanitation systems, where poor monitoring and maintenance potentially translates into failed services, flooding, pollution and contamination.

The Makana Environmental Health department is responsible for monitoring (bacteriological) groundwater and surface water sources used to supply households, including the three boreholes serving Riebeeck East together with Alicedale's New Years Dam, and Grahamstown's Jameson, Milner, Howison's Poort, Settler's and Glen Melville dams. DWAF is expected to monitor all other water sources, although negotiations are underway to entrust the Makana LM with this responsibility. Limited capacity is the key constraint to effective monitoring by DWAF, and Makana, in its current and any potential expanded role. In addition to its monitoring role, the Municipality is responsible for instituting a Pollution Awareness Programme. This is not currently in place but Makana is confident that this will be realised within three years (Makana WSDP, 2007).

The provincial Department of Health currently undertakes random sampling of borehole water in the Eastern Cape to monitor chemical levels and is developing a monitoring programme, which should come into effect within the next few years. The latter programme includes software development of a provincial water quality monitoring system, linked with all the districts' information systems, to manage and analyse data (water quality, chemical assessment, potential contamination) in order to assess risks and develop a community health profile to inform the prioritisation of projects and interventions across the Province. Currently, the Department of Health are involved at the start of any borehole installation process where water quality is investigated through chemical assessments as well as through evaluation of potential surface water contamination (and subsequent groundwater contamination) by surrounding land uses.

The provincial DWAF have implemented a water quality management system, which is updated and used by all WSAs, and automatically notifies listed water services managers if failures or contaminants (e.g. *E. coli*) are reported. WSAs should ideally monitor water quality and update the system either once a shift or daily. Makana currently undertakes such monitoring once every two months. The water quality management system can be used as a tool to assess risks (infrastructure, water quality) and performance (institutional, systems) as well as to monitor drinking water quality.

A concern noted earlier, in relation to IDPs, is that LMs deal only with "what they know" and overlook development aspects which directly impact upon them – notably WRM – leaving such aspects to be dealt with by district municipalities. This concern extends to provincial DWAF, where the various directorates are described as being very busy doing "what they know", but are operating in a manner that is not integrated. DWAF recognises that communication channels are not well developed, both internally and between DWAF and WSAs, which undermines efforts towards effective monitoring and greater integration. WRM falls within DWAF's Regulations and Use Directorate, while water services falls within the Sector Support Directorate. The DWAF is currently in the process of restructuring and aims to integrate resource and services management into one water sector management or support branch. However, provincial capacity is not presently in place to cope with the full range of responsibilities, including water services and resource, environmental/resource protection, and

management. In furthering appropriate restructuring, strategic sessions are being convened with relevant stakeholders, including DWAF directorates and WSAs.

At the local level, limited institutional restructuring has also been proposed in terms of combining the departments of Environmental Health and Makana Technical Services in order to enable improved cooperation and strategy formulation to manage water resources effectively, such as ensuring clean rivers.

5.1.3 Intergovernmental support for the compilation of IWRM Plans

According to the IWRMP Guidelines, the following principles are required for successful implementation of the IWRMP (WRC-DWAF 2007: 91). The issues related to intergovernmental relations are highlighted in italics:

a) Availability of adequate resources – financial and human resources;
b) Appointment of a coordinator or champion within the municipality to facilitate the necessary integration, communication and collation and dissemination of information;
c) Support of the coordinator at the managerial and political level, including enabling access to resources to perform the functions of the coordinator adequately;
d) Involvement of the Local Authority in a *DWAF-Local Authority Forum or CMA-Local Authority Forum* dealing specifically with IWRM to facilitate implementation of Local Authority IWRMPs in line with the Catchment Management Strategy and in conjunction with implementation of the WSDP and IWMPs where applicable;
e) Inclusion of IWRM issues in *existing intergovernmental forums* established in terms of cooperative governance;
f) *Provision of assistance* to Local Authorities from provincial and national government departments;
g) Development of the optimum approach for implementation will need to be on a case-by-case basis due to the broad variation within Local Authorities, and *where capacity is lacking implementation may need to be driven by the CMA/DWAF.*

According to the IWRMP Guidelines, "Implementation of IWRM by a Local Authority CANNOT be done in isolation but MUST occur in terms of cooperative governance i.e. in conjunction with other Local Authorities within the water management area or catchment and the Department of Water Affairs and Forestry, until such time as the CMA is fully functional. The crucial role of *cooperative governance* is emphasised when the mismatch between the political and catchment boundaries is taken into consideration" (WRC-DWAF, 2007: 10).

In many cases, the responsible support agency is the CMA which does not yet exist, or is not fully functional. Consequently, other agencies (such as DWAF or the provincial Department of Environmental Affairs) are required to assist municipalities, until CMAs are fully functional. According to a provincial DWAF respondent, in the absence of a CMA, as is presently the case for Makana, provincial DWAF "is the CMA" (*pers.comms.* February 2008).

The CMS is a critical document when formulating the IWRMP. However, corresponding with the absence of a CMA, there is presently no CMS available. In such instances, as for Makana, "the IWRMP should be aligned with the National Water Resource Strategy with the intention that the IWRMP will inform the future development of the Catchment Management Strategy" (WRC-DWAF, 2007: 37).

The IWRMP Guidelines for Local Authorities (WRC-DWAF, 2007: s8), presents a fairly detailed checklist for the development of an IWRMP based on required content. This IWRMP checklist has been drawn on to develop the table presented below. Officials of DWAF and the provincial departments of Health and Environmental Affairs have been requested to provide information in response to the functions listed in the table. Unfortunately, repeated requests yielded responses only from the Department of Health. The Department of Environment appears to have a 'policy' of not answering the telephone and did not respond to repeated electronic requests. DWAF officials are more accessible but were unable to respond to the request timeously. One DWAF respondent noted that the listed functions require an integrated response, such that a meeting would need to be convened with representatives from each directorate to comprehensively address each function for a particular WSA. Nonetheless, the DWAF official described the list as a useful reference tool when looking at IGR issues and required activities of IWRM and planning.

In the absence of responses it must be noted that the bulk of tasks/questions (organisation's role) required in completing an IWRMP are provided for within the Internal Strategic Perspective (DWAF, February 2005). The Department of Health respondent indicated that the health information relating to clinics and statistics is readily available, while information relating to boreholes may be readily accessible within the next few years as the water quality monitoring system is institutionalised across the Province. The respondent further noted there are departmental structures 'on the ground', specifically the Makana office of Environmental Health, and this local office will generally be the WSA's best source of information in compiling the IWRMP.

Table 5.3 Summary table of roles and responsibilities in support of Local Government water services provision.

FUNCTION	ORGANISATION	ROLE of ORGANISATION
1. Local authority's (LA) objectives	CMA	Assist in aligning LA's objectives with the CMS.
2. LA organogram and IWRM responsibilities	CMA	If capacity is lacking in the LA, the IWRM coordinator/champion may be located at the CMA level.
	Prov. Dept Environment	If capacity is lacking in the CMA, at least one coordinator/champion should be appointed at provincial level.
	DWAF	Train a municipal coordinator in the implementation of IWRM.
3.Baseline information including topography, climate & environment	CMA	Provide information if available.
4. Layout of the LA showing settlements (formal and informal) and other land uses	CMA	Provide information if available.
5. Demographics of the LA area	CMA	Provide information if available.
	Provincial	Provide health statistics if requested.
6. Provide regional CMA perspective – description of the region	CMA	Provide description of the region.
7. Summary of Section 21 water uses	CMA	Assist municipality if capacity is lacking.
8. Description of catchment(s), water management area and resource class	CMA	Assist LA if requested.
9. Hydrology: Flow data	CMA	Collate and assess flow data within the LA area of jurisdiction.
10. Hydrology: mean annual runoff, dry weather and peak flows	CMA	Determine values for the catchment areas within the LA area of Jurisdiction.
	DWAF	Determine values for the catchment areas within the LA area of jurisdiction if the CMA is not yet established.
11. Surface water users	CMA	Assist LA to identify all surface water users and establish quantity and quality requirements.

FUNCTION	ORGANISATION	ORGANISATION ROLE
12. Surface water quality – surface water monitoring program	CMA	Assist LA to identify all entities undertaking monitoring in the local catchment and subsequent gaps and overlaps.
	Prov. Dept Environment	Assess compliance with provincial ordinances in terms of monitoring requirements.
	DWAF	Assess compliance with the monitoring requirements included in the water use authorisation conditions.
13. Surface water quality – biomonitoring program (river health)	CMA	Assist LA to identify all entities currently undertaking or required to undertake biomonitoring in the local catchment, and subsequent gaps and overlaps.
	Prov. Dept Environment	Provide LA with the provincial biomonitoring program for the local catchment.
	DWAF	Fulfil CMA responsibility if the CMA is not yet established.
14. Air quality monitoring	Prov. Dept Environment	Assist in alignment with the provincial air quality program for the region.
	National DEAT	Assist in alignment with national initiatives.
15. Overview of surface water quality, quantity and river health	CMA	Provide relevant data to LA. Review data assessment and evaluation of compliance with water use authorisation conditions.
	Prov. Dept Environment	Provide LA with biomonitoring report/data for the local catchment and priority areas of concern.
	National: DWAF	Review data assessment and evaluation of compliance if CMA is not yet established.
16. Identification of areas of concern and potential pollution sources	CMA, DWAF, Prov. Dept Environment	Provide LA with information regarding additional areas of concern, if any.
17. Overview of geology of the area	CMA	Assist LA if requested.
	National: DWAF	Provide LA with the geology of the area: description and geological map if required.
18. Database of abstraction and monitoring boreholes	CMA	Assist LA to identify all entities undertaking monitoring in the LA area of jurisdiction if required. Assess compliance with the monitoring requirements included in water use authorisation conditions.
	DWAF	Fulfil CMA responsibility if the CMA is not yet established.
19. Aquifer parameters and aquifer test data	CMA	Provide available data/specialist reports to the LA.
	DWAF	Provide available data/specialist reports to the LA.
20. Groundwater users	CMA	Provide LA with all groundwater user information.

FUNCTION	ORGANISATION	ORGANISATION ROLE
	National: DWAF	Provide LA with all groundwater user information if the CMA is not yet established.
21. Groundwater monitoring program (quality and quantity)	CMA	Assist LA to identify all entities undertaking monitoring in the local area and subsequent gaps and overlaps. Assess compliance with the monitoring requirements in water use authorisation conditions.
	DWAF	Fulfil CMA responsibility if the CMA is not yet established.
22. Groundwater quality: Description, coordinates and location of all groundwater monitoring points	CMA	Provide relevant data to LA. Review data assessment and evaluation of compliance with water use authorisation conditions.
	DWAF	Review data assessment and evaluation of compliance if CMA not yet established.
23. Groundwater quality: Identification of boreholes of concern (quantity and quality) and potential pollution sources	CMA, DWAF, Prov. Dept Health	Provide LA with information regarding additional boreholes of concern, if any.
24. Water supply	CMA	Include volume requirements in water management area situation assessment to facilitate equitable allocation of water.
	DWAF	Fulfil CMA responsibility if the CMA is not yet established.
25. Grey water runoff	DWAF	Include volume requirements in water management area situation assessment to facilitate equitable allocation of water if CMA not yet established.
26. Diversions, alterations and river crossings	CMA	Provide LA with location of all diversions, alterations and river crossings not owned by LA but within its area of jurisdiction e.g. river crossing on mining site.
	Provincial Dept Roads	Provide LA with location of all provincial road crossings.
27. Removal of underground water from construction sites and basements	CMA	Provide details to LAs of existing and planned (water use licence applications) removals of underground water.
	Prov. Dept Environment and DEAT	Provide LA with details of EIAs for removal of underground water for review.
	DWAF	Fulfil CMA responsibility if the CMA is not yet established.
28. Recreational water uses	CMA	Assist LA if requested, to collate information on water sports, fishing etc.
29. Water balance	CMA	Assist LA if requested.

FUNCTION	ORGANISATION	ORGANISATION ROLE
30. Waste management	CMA	Provide information if available, on waste streams and sewage sludge.
	DEAT	Provide input regarding status of waste site permit applications and authorisations.
	DWAF	Should be able to provide input regarding status of waste site permit authorisations as all waste applications need to be reviewed by DWAF.
31. Waste streams	CMA	Provide information on industries directly discharging to the watercourse and all waste generating entities within the LA area of jurisdiction that do not use the LA waste disposal systems, if requested, so that these waste streams can be plotted on the LA layout.
	DWAF/DEAT	Provide information on industries directly discharging to the watercourse and all waste generating entities within the LA area of jurisdiction that do not use the LA waste disposal systems, if requested, and the CMA has not yet been established.
32. Hazardous waste	CMA	Provide information if available.
	Provincial: DEAT	Provide above information to LA and input regarding status of waste site permit applications and authorisations.
	DWAF	Should be able to provide input regarding status of waste site permit authorisations as all waste applications need to be reviewed by DWAF.
33. Other Wastes e.g. medical and veterinary	CMA	Provide input regarding other waste streams if requested.
	Prov. Dept Environment	Provide above information to LA.
	National: DWAF/DEAT/	Provide input regarding other waste streams if requested.
34. Possible impacts to the water environment	CMA	Assist LA if requested, to describe the identified and potential impacts and their significance.
	Provincial	Provide information for infrastructure falling under province e.g. hazardous waste sites.
35. Risks to the water environment	CMA	Assist LA if requested, to calculate risks.
	Prov. Dept Environment	Facilitate with the risk assessment, if requested, in terms of the Provincial Disaster Management Plan.
36. Risks to human health	CMA	Assist LA if requested.
	Provincial: Health	Provide information/health statistics from provincial clinics.
37. Cumulative risk assessment	CMA	Assist LA if requested, to calculate risk for downstream users who received combined impacts from upstream users

FUNCTION	ORGANISATION	ORGANISATION ROLE
38. Key performance areas (KPAs) and indicators (KPIs)	CMA	Provide input in terms of the CMS.
	Prov. Dept Environment	Provide input based on river health and review KPAs and KPIs in terms of the Provincial Development Strategy.
	DWAF	Review KPAs and KPIs in terms of the National Water Resource Strategy.
39. Performance monitoring	CMA	Assess LA performance.
	Prov. Dept Environment, DPLG	Assess LA performance.
	National: DWAF/DEAT	Assess LA performance.
40. Catchment management	CMA	Provide input into the development and implementation of the LA IWRMP and ensure it is aligned with the CMA's Catchment Management Strategy or where the CMS has not yet been developed, ensure that the IWRMP is used as input into the CMS. Refer to the National Water Act for the CMA's specific legal obligations in this regard.
	DWAF	Provide input into the development and implementation of the LA Catchment Management Strategy if the CMA is not yet established.
41. Water conservation/water demand management	CMA	Provide input for other sectors within the LA area of jurisdiction.
	DWAF	Provide input for other sectors within the LA area of jurisdiction if the CMA is not yet established.
42. River and wetlands	CMA, DWAF Prov. Dept Environment	Provide input on specific projects being undertaken.
43. Groundwater protection and recharge	CMA	Provide input on specific strategies or measures being undertaken.
	DWAF	Provide input on specific strategies or measures being undertaken.
44. Land use	Provincial: DACEL, DEAT	Provide input on development and remediation projects being undertaken.
45. Pollution control	CMA	Provide input regarding specific measures to be undertaken by the CMA.
	Provincial: DACEL	Provide input regarding specific measures to be undertaken by Province.
	National: DWAF, DEAT	Provide input regarding specific measures to be undertaken by DWAF/DEAT.

CHAPTER SIX

6. RECOMMENDATIONS FOR IMPROVEMENT AND CHANGE IN SERVICE QUALITY AND APPROACH TO SERVICE DELIVERY LINKED TO WATER RESOURCES MANAGEMENT. Fox & Haigh.

This section is structured in the following way:

A. Required water services improvements
   1. Operational & Functional improvements
   2. Management improvements

B. Change in Approach - Moving towards Integrated Water Resources Management (IWRM)
   1. Required institutional structure changes
   2. Improved public participation and customer service

IWRM requires sustainable management practices. In water services, sustainable management implies adhering to mandated tasks and complying with the tasks set out in the 10 business elements of the WSDP. We have identified the following improvements that must be made in the water services delivery practises of Makana Municipality to achieve compliance. The most important task as a water user in WRM at local government level is compliance to water use regulations, especially in effluent management, pollution control and consequently water quality management.

6.1 Required water services improvements

6.1.1. Operational & Functional improvements

6.1.1.1 Providing potable water

At present the Makana municipality is struggling to supply water services effectively. Problems are manifold but seem to originate from lack of suitably trained staff in all spheres of water services delivery and poor operation and maintenance plans and budget.

6.1.1.2 Staff

Sourcing appropriate staff and sending incumbent staff for training is essential. Amatole Water Board offers training courses for plant operators. Offering local matriculants scholarships for training seems to be the most effective long-term method of remedying the problems. In the short term looking for help from suitably trained consultants seems to be the only solution. We suggest going to the DWAF for assistance.

6.1.1.3 Managing the system

Completing the Water Services Development Plan (WSDP) will require updated and improved recordkeeping in an electronic system for all aspects of water services management.

6.1.1.4 Ageing infrastructure

The operation and maintenance budget is miniscule and not ring-fenced and plans and procedure are not in place. It is important to undertake bulk quantity monitoring to determine water balance, begin to

develop a water conservation and demand management plan and track infrastructure weaknesses and monitoring leakages**.** This will require an improvement in the metering system.

6.1.1.5 Wastewater treatment and pollution control - Sanitation

Makana Sewage treatment works needs to be upgraded from the current capacity of 4 Ml/day to approx 8 Ml/da. Ninham Shand has prepared a report on the upgrading of the works, and this report recommends an activated sludge process to meet the target standards for January 2010.

6.1.1.6 Pollution control

Sources of hazardous waste must be identified. Laboratories, hospitals, university science research departments, tanneries and abattoirs can produce hazardous waste or waste water. The municipality must produce bylaws to regulate effluent and its specialist treatment i.e. Trade Effluent Standards. Grey water management needs to be managed together with storm water. Plans and protocols are currently missing and no retention pond or soak-aways are in place.

6.1.1.7 Monitoring system

It is urgent that Makana municipality establish a monitoring system. The database mentioned above can serve all monitoring needs as required if suitably structured.

The expense of monitoring should be included with the sewerage service charges of individual industries. The Municipality will have to budget for the random monitoring by a municipal inspector.

Once Trade Effluent Standards are compiled, a set of guidelines must be laid out as to the response mechanisms when the standards are contravened for a continuous period. A lag time should be set with a deadline as to when all industries must be compliant to new standards, after which, if the industry continues to fail to comply with standards, a fine should be issued on each consecutive occasion of contravention.

6.1.1.7.1 Recommended Water Quantity Monitoring

The NEMA Act (2003) (Section 31C) allows for environmental management inspectors to be appointed by the provincial government. Environmental progress reports on industries will likely be completed by these environmental inspectors. However, ecological monitoring and reporting should also be included when reporting to Makana Municipality.

For ground water quantity and quality monitoring in Riebeeck East, by-laws for groundwater analyses need to be promulgated by the Makana Municipality. Both domestic water use and borehole use on farms should be measured with meters, with the Makana Municipality monitoring water use data, through an integrated approach partnering with DWAF. The development of CMAs will facilitate this integrated approach.

6.1.1.8 Stormwater management

Stormwater is an integral part of WRM and there is much ongoing research in South Africa in this area. Several new ideas have been brought to the attention of the Makana Infrastructure and Technical Services:

- Planning for so-called infiltration zones, where green zones are linked. This uses natural vegetation and the environment to capture storm waters. Makana has a number of wetland areas

which can be used or returned to their more natural state. The motivation is to capture stormwater for immediate use before filtration to the rivers or underground seepage.

- Discourage canalizing streams in new developments, and rather link these streams to the management of green zones and parks. The City of Cape Town has been successful in this regard.
- The use of litter traps is invaluable (Stellenbosch Municipality).
- Encourage the installation of rainwater tanks and the removal of downpipes that lead to the sewers of houses.

6.1.1.9 Improve the tariff system

Makana does not implement a clearly stepped tariff system. Professor Hughes noted that the principle of free basic water was not properly understood by municipalities in general. 6 kl per household per month was to be free for all, after which a step tariff system should be used as the most straightforward strategy. In Grahamstown the indigent have totally free water while the paying consumers pay for all water.

6.1.2 Recommendations for Water Quality management in MAKANA

An implementation plan would include four principle suggestions:

1) An eco-toxicological risk assessment, based around Grahamstown and its STWs;
2) The development of hydrological and water use models for Makana;
3) An assessment of the natural salinity levels within the water resources.
4) Water quality and quantity data management by (DWAF and therefore) Makana Municipality;

6.1.2.1 Alicedale Evaporation Ponds (AEP)

Due to the recent increase in the number of houses added to the water borne sewerage system of Trans Riviere and Kwanonzwakazi, the design capacity of the AEP ponds has been exceeded. There is a significant quantity of effluent discharging into the environment with no adequate planning and upgrading of facilities. DWAF officials were not aware of this situation at the time of investigation. This highlights the need for flow rate monitoring and cooperation between municipal monitoring and DWAF monitoring; and interpretation of monitoring results.

6.1.2.2 Sewage treatment works

The monitoring of industries' discharge at the point of release into the sewers must be combined with the current monitoring data of influent quality and quantities at the inlet of the Grahamstown Disposal Works (GDW). The results of this comparative monitoring will allow combined toxicities to be examined, which will help determine individual effluent standards for each industry. All results should be compared to the engineering specifications and design capacity (including biological capacity) of the sewage treatment infrastructure to determine its capacity to treat the identified toxins to an adequate standard for release. Comparison of identified industrial wastewater and the influent into the GDW will also identify unknown pollution sources and allow further investigation into control of these toxins e.g. oils, organic solvents and heavy metals.

6.1.2.2.1 Expertise needed

Microbiological or at least laboratory skills are necessary to carry out correct testing. These are currently outsourced. Expertise is required within the Municipality to interpret results; and knowledge of individual works is necessary to carry out the follow up actions required to remedy problems (Gambiza and Palmer, 2004).

6.1.2.3 Trade Effluent Standards

The monitoring of industrial effluent and comparison to sewage influent monitoring data will enable Trade Effluent Standards, appropriate to Grahamstown, to be drawn up by the Municipality with a view to appoint an inspector as stipulated in the latest bill of the Municipal Systems Act. Once Trade Effluent Standards are established, compliance monitoring will be necessary to ensure compliance. There is currently no known industry which discharges effluent into the Mayfield Oxidation Ponds or the Alicedale Evaporation Ponds and no industry with significant discharge exists in Riebeeck East.

6.1.2.3.1 Frequency of Monitoring

Initial industrial effluent monitoring should take place monthly to establish norms for each industry. Random sampling by a municipal official or municipal contractor must also be carried out to ensure sampling is being carried out according to stipulated conditions and undesirable effluent is not discharged at other times. Once Trade Effluent Standards are in place, monthly monitoring should continue as compliance monitoring.

6.1.2.3.2 Responsibility of Monitoring

A large proportion of the responsibility for monitoring will lie with individual industries. The responsibility of random monitoring should fall to the municipal inspector to be appointed under the latest Amendment to the Municipal Systems Act, or to an external contractor or laboratory to ensure realistic results (Gambiza and Palmer, 2004).

6.1.2.3.3 Expertise required

Correct identification of sampling points and sampling techniques are necessary to ensure value of data collected. Expertise in wastewater analysis is necessary to identify toxicity and specific toxins present. The City Engineers and experts in wastewater treatment technologies will be able to determine the capacity of the current sewage treatment infrastructure to treat identified toxins adequately. Expertise in interpretation of results from the industrial effluent monitoring will be necessary to establish Trade Effluent Standards (Gambiza and Palmer, 2004).

6.1.2.3.4 Guidelines for responses

Once Trade Effluent Standards are compiled, a set of guidelines must be laid out as to the response mechanisms when the standards are contravened for a continuous period. A lag time should be set with a deadline as to when all industries must be compliant to new standards, after which, if the industry continues to fail to comply with standards, a fine should be issued on each consecutive occasion of contravention. Improvement in industrial effluent quality and quantity will decrease pressure on the STW and can bring in additional income if complex industrial wastes are fined when discharged (Gambiza and Palmer, 2004).

6.1.2.4 Data management

Monitoring of sewage treatment works can contribute directly to the monitoring of community and river health as well as help in identifying sources of pollution and control industrial effluent. Though some monitoring is occurring, access to the monitoring results are difficult to come by (Gambiza and Palmer, 2004).

All data should be kept at a common point and be accessible to any interested and affected parties. Data should be collated and assessed by a relevant expert either within the Municipality or outsourced, initially with recommendations for the drafting of Trade Effluent Standards. It is understood that a

template of the Trade Effluent Standards has been developed by the Grahamstown City Engineers (Gambiza and Palmer, 2004).

Monitoring is meaningless unless data are interpreted and reported over time. Improvements in individual industries' effluent qualities can and should be tracked over time, allowing for award schemes, tariff reductions or fines to be issued according to performance. Data reporting will allow for more transparency within the Municipality and cross-sectoral communication. Public access via the Municipal website will allow complete transparency and ease of access (Gambiza and Palmer, 2004).

6.1.3 Management improvements

6.1.3.1 Data/ information management

All municipalities around the country are to have a GIS system in place which links the water services infrastructure plans of each town to household details and payments made. Makana has presently contracted this out for development. The facility to capture data in WATERMOD is therefore being linked to this GIS system.

6.1.3.2 Self - Education of incumbent officials

It is very important for officials to know where the information sources are and to study the planning and management strategies available from government. If this is beyond their capacity a plan should be made to find suitable workshops and attend them. The District Municipality, SALGA, WIN-Water and WISA all offer workshops and training materials, including the:

- Internal Strategic Perspective (DWAF)
- Strategic Framework
- National Water Resource Strategy
- Water Resource Situation Assessment
- Water Resources Framework
- Catchment Management Strategy (2007)
- Water Services Development Plan
- Integrated Development Plans for both municipal and regional entities.

To help new councillors/ the municipal manager understand the issues on the ground, they can be taken on field trips to purification plant/sewage works to understand how they function and the risks of poor management and budgeting.

6.1.3.3 Bylaws and regulations

The lack of adequate by-laws is a serious issue in regulation of management processes but is not unique to Makana. By-laws could be used to encourage each household to have a water tank for when water supply needs repair.

More should be done by DWAF, SALGA and DPLG to rectify this situation. The development of appropriate by-laws provides an opportunity to incorporate IWRM principles across the various sectors within the municipality. Examples include stormwater management by-laws including a requirement to install retention ponds for runoff if the development exceeds a certain size and bylaws prohibiting down-pipes into the sewer systems.

6.1.4 Concluding steps

Better service delivery is the first step in an integrated water management system. The changes required towards better services delivery can be set out in the following steps.

1. Data capture and information generation. Improve data capture and analyses and align these methods to those of the DWAF and the CMA. Complete compliance with water use licensing regulations requires a shift in municipal management responsibilities and better monitoring systems.
    - This entails the establishment of an electronic data recording system for all bulk and domestic water quantities, discharge quality monitoring and payment for water.

2. Improve water services delivery procedures.
    - Drafting and implementation of the WSDP and the water conservation and demand management strategy by municipal staff with only the assistance of a consultant as a trainer in the initial period will improve the management systems. If the WSDP were to be properly developed, water availability would form a core consideration in new infrastructure development plans such as housing and industrial parks. Ditto the size and capacity of waste water treatment plants. Successful completion of this process is directly dependant on effective data collection and information generation (1st point).
    - Inherent in improved water services delivery is the institution of an automated complaints register and response system. This system acts as an automatic monitoring system for service levels and infrastructure condition. This system should have links to the system discussed in 1. Gradually, as the electronic data management system becomes more familiar, the introduction of a GIS must be considered.

3. Most municipal functions have identifiable impacts on water resources and their management. Training and development programmes for councillors and staff should be undertaken to raise awareness about the impact of municipal actions on water resources. This should pave the way for a re-alignment of municipal internal structures to bring about better integration in those services that impact water. The functions can be separated into two separate units, namely those where the core concern is water, such as water services delivery, and those where the core concern is not water such as waste management (Burke, 2006). Water resource monitoring systems and waste management which currently resides in the Environmental Health division, will have to refer to and work more closely with waste water management which resides in the infrastructure management division where water services delivery is currently located.

6.1.4.1 Outcomes of Operation and Management improvements

Better Water Resources Management (WRM) approaches will automatically be translated into better health, education and a more aware public. If these suggestions are followed it will improve public communication.

6.2 Changes in approach - Moving towards IWRM

6.2.1. Institutional changes required

6.2.1.1 Integration

Dent (2007a) has many thoughts on institutional integration. In one of his newsletters he states: "In the development of our technology and in the organisation of our intellect in the field of water we need to start with the end in mind. We need to stand in the future and see the connections. The National Policy White Paper, the 1998 National Water Act, the 1998 National Water Services Act, our scientific knowledge of systems and our common sense all tell us that the end must be an integrated, interconnected, holistic socio-scientific system of people and technology."

Implementation of IWRM is not about commanding hands and feet to do things. It is about influencing hearts and minds to see, reflect, empathise, care, listen, connect and think collectively. Implementing IWRM involves changing the way we think and behave. IWRM involves managing relationships, managing competing demands and learning (Dent, 2007b).

There is still considerable scope in the region for better integration and coordination between and within all levels of government. This should also include improved communication with other IWRM stakeholders such as civil society, NGOs and the private sector.

Local governments have a critical responsibility to co-ordinate Local Agenda 21 (LA21) activities … water organizations will form a useful core for these integrated activities.

The IDP demands a developmental management system which is different from a performance management system as required by the Municipal Systems Act, which deals with targets and accountability. Developmental management systems require a holistic, participatory approach, which develops projects and assigns institutions who will oversee management. Performance management systems are task-based and requires KPIs to be with responsible persons who are held accountable for performance.

These systems are not very compatible at present due to a functional misalignment, but for the municipal management systems to become fully functional and for IDP projects to become reality, the two systems have to be melded. It is important for developmental management to incorporate performance management protocols into each of the projects identified for development.

For IWRM plans and systems to be formulated and applied, a gradual reformatting of the way in which the municipal management system is structured and functions will be required. At present there is little collaborative management between various directorates to the extent that the financial unit does not collaborate with the other directorates to plan budgets. They operate in functional fortresses or silos.

6.2.1.2 Suggested approach to integration

To move towards better integration each mandated responsibility of the municipality must be broken down into separate tasks. These tasks must have a set of KPIs assigned to it. The tasks must then be re-aligned into closely associated clusters with a project leader or assistant Director assigned to each cluster. In the cluster called Water Resources Management the following service delivery functions should be located: water service delivery, waste management, roads and storm water management. In

this cluster there needs to be a better understanding of the impacts their actions have on the water resource. These clusters must be multi skilled. For example, the water cluster needs civil engineers, plant operators, plumbers, electricians, meter readers and a data capture clerk. Each cluster must also have access to a director who is a specialist, i.e. a financial expert, social services expert and a corporate services/Human Resources manager. Specialist skills required by the water cluster include chemistry, geology, hydrology and borehole management, water balance calculation, water conservation and demand management and water quality monitoring. Disaster management should incorporate representatives of climatologists, stormwater management, firemen, police and risk assessors and health and social services. These skills could either be outsourced as they are not needed on an ongoing basis placed in the District Municipality or CMA. The CEO will then oversee the comprehensive month by month management of the municipality and the directors will be approached for direction in their areas of expertise (Collier pers.comm. 2007).

6.2.1.2.1 From Fortress to Game Park

Dent (2007a) describes a scenario to help us visualise the changes needed. He explains that the change needed is like taking down fences and breaking down walls to change a fortress to a game park where movement is free and easy and air flows readily.

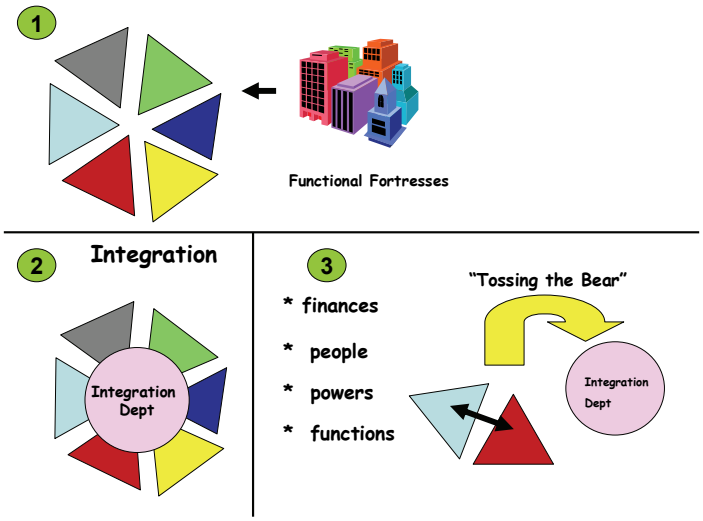

Figure 6.1. From Fortress to Game Park. 1: The fortress becomes disbanded and reformatted into new groups of associates. 2: A team is appointed to help liaise between naturally distant groups, i.e. potable water and solid waste. 3: Problems arise and difficult bear-like problems are tossed at the integration team who cannot solve them. The whole process is in jeopardy. To get through this period solving an integrated problem will help.

Think of each of the triangles depicted in Figure 1 as a department with specific line functions. They need to work together to serve a common goal and/or customer. Line function units have developed into functional fortresses at some stage/s in their existence because each component group is focusing on their very specific area of responsibility. Internal performance measures often unwittingly encourage fortress development. If one stands back and looks at the bigger picture and the bigger goals, one finds a direct correlation between the emergence of functional fortresses and declining delivery.

Declining performances put more pressure on the system and often the fortress keepers increasingly focus on their own tasks. At some stage the pressures get too much and the call comes down from the top, “We need to integrate & coordinate our efforts.”

An integrated problem such as deteriorating rivers, that requires the efforts of several departments, can provide the impetus for the start of an integrating process. A small appropriate integration team of visionary collaborative people will be needed to see the process through and keep a focus on the triple bottom line goals of equitable allocation, economic efficiency and environmental sustainability. All effort should be made not to move difficult problems into other departments, but rather face problems and together develop solutions.

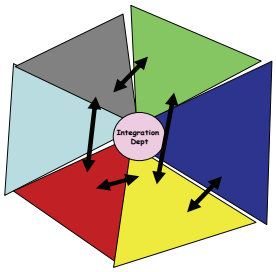

Figure 6.2. "Own the problem" Integration in action through collaboration and sharing

Dent (2007a) explains that leadership from an integration team requires being able to see the synergies and cooperation potential in the various departments. The team can be small and financially lean but must be influential and practice transparency and full disclosure. Institutional memory and stability is a wonderfully powerful tool for successful integration of disjunct functional entities that have unrealized commonality. There is much to be gained from engaging Stakeholder Sector Advisors. It is important to learn to collectively own the problem and work together to find solutions under the guidance of the integration team. In under-resourced municipal managements the integration process will be hard to set in motion as people are already stressed just paying attention to their line functions.

Whilst we all know that we are working with one system that is completely connected, we spend almost no time at all on the connections in our organisational systems. The 1998 NWA and the CMA concept in particular, were designed to help us make these connections (Dent, 2007a).

6.2.1.3 Differences in planning approach

Consult the "Framework for IWRM for Local Government" Table 1, to familiarize oneself with the similarities, differences and new tasks between WSD, IWRM and IWM. One of the most far-reaching changes that have to be realised is the alteration in institutional alignments as already alluded to. The other changes needed are some additional tasks that should be considered.

6.2.2 Management changes required

6.2.2.1 Public relations/ participation/ community engagement

Akharwaray and Atkinson (2002) examined how municipalities can develop a positive client interface. This question is a critical and deeply neglected matter. If one compares the emphasis placed on this issue by private companies (e.g. Pick and Pay), municipal performance feels far short. Private companies take a great deal of effort to ensure that the customer truly feels like "a king".

Most customers make contact with their Local Authorities in the following ways:

- By paying their accounts, either by post, or by visiting the municipal office – the front-line staff are therefore the payments clerks.

- By receiving visits from water-meter readers.
- By interacting with municipal staff on development projects – typically, middle-level technical staff or environmental health officers.

High calibre public interface staff is of great importance. For high calibre front-line staff, the Local Authority will need to provide back-up support through:

- Materials to deliver (e.g. newsletters, survey forms) for meter readers.
- Appropriate training and orientation.
- Analytical skills (e.g. to analyse survey results).
- Ability and willingness to re-direct municipal operations to identified needs
- Considering incentive/performance bonuses (Akharwaray and Atkinson, 2002).

6.2.2.1.1 Community education and development programme

Providing relevant information and education is a mandated responsibility of the municipality. Providing a community education and development programme is an urgent issue as public behaviour is a problem and societal disintegration evident everywhere. Such a programme should be developed and presented at a level ordinary citizens, but especially youth, will be able to relate to in order to establish an informed and interested next generation. The primary objective of the suggested education and training programme is to inform the community about the functioning of the Municipality, for example:

- Educating and positively influencing stakeholders on environmental issues and consolidating and reinforcing environmental values as part of the city's overall values and increasing the importance of environmental issues within the organisation by explaining how to contribute towards a clean and healthy living environment and the impact of littering and inappropriate public behaviour on water resources. This will help:
  - Contribute to the image building of the city as being environmentally aware;
  - Facilitate awareness of the city's environmental performance and its environmental policies, objectives and targets, and achievements.
- Role clarification of the different municipal structures, e.g. the council, its committees, political office bearers, officials and ward committees.
- Building trust, creating dialogue and enhancing mutual understanding of the city's stakeholders by explaining
  - Constitutional rights and obligations of citizens in respect of local governance.
  - How and why policies are formulated and the role that the community can play in the process.
- How to deal with complaints. Facilitate timely and appropriate response to internal and external queries and reported incidents.
- Understand the facts and implications of developmental local governance.
- Understand financial management of the council: How the budget is prepared and implemented. This will hopefully
  - Reconcile community expectations with realities facing municipalities.
  - Lead to understanding the limitations of the Municipality in terms of resources to render basic services and the importance of payment for basic services.
  - Help citizens consider the financial implications of the upgrading of services such as sewerage systems and streets (Akharwaray and Atkinson, 2002).

6.2.2.1.2 Promoting user-friendly service

1. *Multi-lingualism:* The public should be served in their languages of preference.
2. *Customer care and multi-skilling:* Improve the capacity of officials through training in customer care with emphasis on the Bathopele principles. Equip as many employees as possible to have general knowledge and skills (multi-skilling) over and above specialised job related training. Through this, a body of knowledge could be made available to disseminate information on a voluntary basis to the public. The costs for training need not be as high as expected and should be offered as in-service training by internal employees. Rotation of personnel through internal transfers is a useful mechanism for the enhancement of the multi-skilling concept which would not have any direct cost implications.
    - *Incentives for staff:* Develop incentives that would motivate personnel, e.g. performance bonuses, letters of appreciation and awards for outstanding achievements in client interface.
    - *Attitudes:* Improve the attitude and behaviour of officials with regard to impatience and negative attitudes among officials towards the public. A proper system of client interface requires a fundamental mind shift by each and every political office bearer and career official rather than extensive monetary investments where they realise what it means to be a civil servant.
3. *Suggestion box:* Introduce a community suggestion box that is checked on a weekly basis by the Municipal Manager and provide feedback. Care should be taken that council is regularly informed about suggestions that have to be dealt with at that level (Akharwaray and Atkinson, 2002).

6.2.2.1.3 Role of meter readers

An effective strategy recommended by Atkinson and Akharwaray (2002) would be for the municipality to use their meter readers more effectively. Meter readers have the massive advantage of visiting every household each month. This is a huge strategic bonus for a developmental institution such as a municipality. This function can be upgraded to provide a primary point of contact with the residents/ clients.

Atkinson and Akharwaray (2002) identified the following additional functions that meter readers could undertake:

- Deliver information / newsletters.
- Conduct surveys of opinions and user needs.
- Discuss households' payment problems, and identify individuals' needs for additional financial advice (which could be provided by a credit control adviser, located at head office).
- Explain the indigent policy and register indigents.
- Show evidence of municipality's successes by means of leaflets and newsletters
- Recruit appropriate people for development projects (e.g. owners of stock for commonage projects).
- Serve as communication agents for national or provincial line departments (municipalities to be paid for this service).

This approach "professionalises" meter-readers to become "Company Reps". They will need a different skills profile and image, possibly with stylish uniforms. Some of the existing meter readers, who cannot be "upskilled", should be transferred to technical maintenance sections. At a Makana ward meeting (2006) it was recommended that the municipality use Radio Grahamstown, fliers and Grocotts

newspaper, as communication tools and taxi ranks to advertise events. It was suggested that a councillor or ward committee member make him/herself available at a set time each week on Radio Grahamstown. In this way, communication between ward members and between ward members and the Councillor could become more efficient.

6.2.2.1.4 Political social management between councillors and wards

Akharwaray and Atkinson (2002) recommend that councillors should meet on a regular basis with the ward committees in their different towns. The frequency of such meetings should be synchronised with the dates of council meetings. The agendas and minutes of council meetings should form the basis of discussions at ward committee meetings. This would ensure that communities receive first hand information about council activities and it would enable them to express their opinions about future actions of the council. Members of ward committees are not entitled to any remuneration and such an arrangement would, therefore, not have any additional financial implications for the Municipality except expenditures related to transport and subsistence. The estimated costs in respect of these activities would amount to approximately R60 000 (6 annual meetings for 5 ward committees @ R2 000 per meeting) per annum. This would enable ward committees to fulfil their obligations as watchdogs on behalf of the community. Eventually this arrangement would also ensure that the needs of the community are communicated to the Council and that the resolutions of Council are communicated to the community. For the above-mentioned to happen, it would obviously be necessary that the decisions taken at ward committee meetings be communicated to the community after every meeting of these committees. For the purposes of accountability, ward committee members should, on a bi-monthly basis, report back to the different committees about their community meeting proceedings. The decisions should be communicated (formally, by means of the minutes) to the councillor concerned and by implication also to Council.

6.2.2.1.5 Improved billing systems and revenue collection

Listed below are five steps to improve billing systems and revenue collection.

1. Design user-friendly accounts (Akharwaray and Atkinson, 2002). Clients are only interested in the number of units consumed, the cost per unit and the amount due. The accounts should, furthermore, reflect any tariff increases, because clients compare current accounts with past accounts and differences in amounts for almost similar consumption is confusing. The introduction of a full-scale pre-paid system, although expensive, offers a solution to this problem.
2. Councillors and ward committee members should be trained to interpret and explain municipal accounts to the public (Akharwaray and Atkinson, 2002). As part of the concept of a one-stop service and multi-skilling, all frontline personnel (employees who make face-to-face contact with the public) from all departments should also be exposed to such training.
    - Awareness campaigns should be held to announce and explain tariff increases and credit control policies. Introduce information campaigns to motivate the community to pay their accounts.
3. Develop *incentives* (Akharwaray and Atkinson, 2002) through which the payment for services by the public is acknowledged and encouraged. Such incentives should be exclusive in the sense that customers must deserve the benefit. A possibility could be that consumers with a "clean" track record of 2 consecutive years of payment of their accounts should qualify for incentives that may include one or more of the following:
    - Cash bonuses.

- A monthly discount on the amount due.
- Differentiation in tariffs for services based on living area and/or income per household.
- Lucky draws for prizes to be won by frequent payers.

4. The public needs common understanding of the importance of payment and participation. There should be warnings on all municipal accounts regarding the hazards of non-payment.
5. Occasional planned and publicized cuts in water supply should be accompanied by publicity of the consequences of non payment.

There is no reason why Makana Municipality cannot adopt these suggestions. However, their present staff structure and physical layout is unapproachable, split between different departments, with little sense of co-ordination and an overwhelming sense of overburdened workload. It may be difficult to motivate these objectives as a whole.

6.2.3 Summary of recommended changes for municipalities to achieve IWRM

a) **Planning and forecasting** - The IDP process requires greater integration in planning and management. The process of drafting sectoral development plans must be changed to put water requirements (both potable and waste) at the core of every planning action in the IDP and also when granting permission for every development. The IDP process requires greater integration in planning and management. Should the IDP process be correctly applied the impact of land development and management on the water resource would be taken into consideration. The economic value of the water required should also form part of the decision making process.

b) **Implementation Plans in the IDP should include** Environmental Management Plans (EMPs), so that IWRM principles are considered. In terms of IWRM these EMPS should focus specifically on zoning regulations for land use in 1:50 year flood-lines including riparian areas, wetlands, ponds and dams. Water quality monitoring is an aspect of EMPs that is important where water is used recreationally.

c) The importance of the appointment of an **environmental manager** cannot be overstated. This person should be given a strategic role to play in terms of all environmental matters including IWRM and be able to influence all directorates. One of his/her prime responsibilities should be to work towards better integration of departmental functions that impacts the environment.

d) **Develop a public participation programme and cultivate an attitudinal change** in political leaders and designated officials. A community education and development programme should be undertaken as a matter of urgency and initiating ward based environmental clubs considered. Innovative communication methods should be designed, e.g. newsletters, road shows, and informed communication by front-line staff. A Public Relations Officer should issue a regular municipal newsletter. Other possible functions for the PR Officer are:
   - Editor of the municipal newsletter.
   - Co-ordination and preparation of press releases.
   - Act as secretary for ward committees.
   - Co-ordination and organising of community meetings initiated by Council.

- Preparation of a monthly report for the mayor and Council to enhance the quality of feedback to the community in respect of service delivery. Assembling of data from the different departments with regard to progress made in terms of council resolutions, service delivery and development projects (implementation of IDP). (Akharwaray and Atkinson, 2002).

e) **IWRM requires** consideration of activities around waste generation, waste management, storm water management and waste-water management (pollution control, monitoring and environmental quality monitoring).

f) For better **financial budgeting** specific funds should be ring-fenced for asset management that includes maintenance of all infrastructure and vehicles but especially rehabilitation funds for Water Services infrastructure.

g) **The new Catchment Management Strategy requires** greater integration and can act as a guide to local government's interaction with CMAs but also with district municipalities. Participation in CMA engenders improved cooperative governance. Assistance in alignment to the Catchment Management Strategy will be needed in the future.

6.3 Resources Needed for Change

6.3.1 Staff training requirements

The Strategic Framework for Water Services (2003) highlights a country-wide shortage of accredited training providers and slow progress in the development of the work placed skills plans.

6.3.1.1 Training needs

- Immediate: Water Act, Water Services Act and the various plans including waste management and water services development.
- Longer term: catchment management and local authorities.
- Workshops on environmental function and the urban area.

6.3.1.2 Functional gaps

- Integration between departments that have an impact on IWRM.
- Materials short and clear in ethnic languages on IWRM will make the understanding clearer.

6.3.2 Essential Skills Requirements of municipal Staff

- Data capture and management, but most importantly data analyses and reporting to councillors in order to facilitate the making of informed decisions.
- Knowledge of the natural environment (the geology and topography of the area, the occurrence of groundwater and the importance of understanding climatic conditions) is a valuable asset in a municipal employee. If these characteristics are generally known and understood, disasters such as flooded neighbourhoods and emergency evacuations can be avoided. Understanding the geology and groundwater distribution of an area is important for the citing of solid waste disposal sites as well as the availability of emergency water

resources. Although a basic degree in the natural sciences can be useful, knowing where to find the information is equally as valuable. Interpretation can be left to a consultant.

- Geographical Information Systems have become a vital tool for planning. Understanding the value of having a person with these skills is important for councillors and municipal managers alike.
- A basic understanding of physical science but especially chemistry is important. Water chemistry is important for the management of water quality as this is a core function of local government in terms of water services and water quality management. Linked to the above is the establishment of monitoring systems for water and air as well as a more general environmental monitoring plan.
- Municipal staff should become familiar with the legal framework for WRM and WSD as it is a valuable aid to understanding roles, responsibilities and ensuring compliance, especially in the field of drafting bylaws and regulations.
- Understand financial management because recognizing the importance of revenue collection as a factor in water services delivery is of critical importance.

Without at least a working understanding of these tasks, integrated development planning cannot be accomplished. The first four tasks link back to data collection and analyses as monitoring without determining trends is a futile exercise.

6.3.3 Water management skills required

To implement Skill Development budget allocation is an essential prerequisite.

Table 6.1 Identified training needs of municipal staff and councillors to enable IWRM.

	Who should attend		
Subject	**Officials**	**Councillors**	**Purpose**
Understanding of concepts and legal requirements			
Introductory course that touches on each training aspect	All officials	All councillors	Give an overview and indicate how everything is connected to discourage silo effects.
Urban water cycle and how the impacts of urbanization affect aquatic ecosystems and environmental functioning.	Interested and affected members and engineering staff.	Yes unless already has a suitable background (biology, science /geography).	Give a sound understanding of the functional aspects of water as a resource and understand the reasons for many laws and regulations.
Interpretive guided discussion of relevant sections of the Water Act Chapters 2, 3&4	All officials in the water services, municipal managers and executive mayors - to be tested.	Introduction needed to all members.	Introduce the South African philosophy of WRM and protection, licensing and obligations of citizens.
National Water Resource Strategy – guided seminars on	All officials in the water services,	Interested parties only	This is the implementation strategy of the NWA and

relevant sections only.	municipal managers and executive mayors.		introduces the approaches and strategies in various sectors. It is also a valuable information resource. An introduction to WR 2005 should be included.
Interpretive guided discussion of relevant sections of the Water Services Act Chapter 3&4.	All officials in the water services, municipal managers and executive mayors – to be tested.	All councillors need this for service on portfolio committees.	This is the framework that outlines water services responsibilities and guides all actions and bylaws.
Water Services Development Plan together with developing an Integrated Water Resource Management Strategy.	Water services staff involved in planning & the financial manager.	Portfolio comm. Members.	Will ensure that the correct people are appointed in posts and that skills requirements are understood.
Integrated management systems and adaptive management principles.	Planning dept, all directors and deputy directors.	Portfolio comm. and interested parties.	Ensures the understanding of changes needed to undertake IWRM.
Project management and supply chain management systems	All senior municipal staff	Portfolio chairmen	Ensure understanding of correct procedure in planning, performance target setting and sustainability of projects.
Sewerage plant operation and waste water quality regulations.		All councillors.	Understand roles and responsibilities.
Potable water preparation, water quality and drinking water quality regulations.		All councillors.	Understand roles and responsibilities.
Practical application			
Introduction to data management and storage.	Finance, water, waste and human resources departments.	Interested parties.	To ensure all members understand the value of information generation and application.
Computer literacy.	All plant operators.	All councillors with no previous skills.	Essential in the modern world.
Data management systems, spreadsheet and relational data storage systems.	Selected employees in designated posts with basic skills.		Develop new skills.
Management systems.	Junior staff with no training in management.	Councillors.	

6.3.4 Environmental management skills required

It is important to provide accredited skills development programmes and learnerships for municipal employees.

Recommendations for priority training programmes include:

- Environmental legislation and policy: A skills development programme focusing on legal compliance issues and environmental management in a local government context, aimed at decision makers such as senior officials and managers and technicians / professionals at levels 5/6 on the NQF.
- A skills development programme focusing on environmental and sustainable development issues and risks in Makana including environmental health issues, social justice issues and ethics. This training programme should be developed for all employee categories but in two versions of the programme - one that is appropriate at the operational level and one that is more appropriate at a management / professional level.
- A skills development programme that focuses on environmental management tools and approaches and planning for environmental management, primarily aimed at decision makers and professionals.
- Entry level environmental management learnerships for workers employed under training category of 'elementary occupations'. These would include workers employed in water treatment, waste disposal and collection, parks / community facility management and environmental management. It is suggested that the Environmental Practices level 1, 2, 3, 4 qualifications be considered as a framework to guide the development of these training programmes.

6.3.5 Specialist skills that may have to be outsourced

- Hydrological modelling,
- Groundwater and borehole flow analyses,
- Risk assessment,
- Sustainability analyses, monitoring systems and adaptive management.

7. APPENDICES

7.1 Appendix 1 – Photographs of the biomonitoring sites on the Bloukrans and Palmiet/Berg Rivers

Site 1. Section of non-canalized Bloukrans River below small road-bridge on Matthew Street, near Fort England Hospital. 33°18'47"S 26°32'29" E. (Site 1 is the site closest to Grahamstown).

Site 2. Stream flowing out of the sewage farm (treated sewage effluent) into the Bloukrans River. 33°18'56"S 26°33'36" E.

Site 3. Section of Bloukrans River below farm-road Bridge close to N2 Highway Bridge. 33°19'04" S 26°34'06" E.

Site 4. Section of Bloukrans River below Railroad bridge and immediately below road bridge. 33°19'26"S. 26°35'59" E.

Site 5. Section of Bloukrans River below weir on Mr. Duncan's farm. 33°19'405"S 26°38'35" E.

Site 6. Section of Bloukrans River at Blaauwkrantz Pools (33°23'28"S 26°42'25" E).

Site 7. Bloukrans River at the farm Luembe, downstream of extensive pineapple plantations 33° 27'27"S 26°41'36"E.

Sites have been dry at time of sampling in 2005, and were not sampled in 2006.

Site 8. Below confluence of Berg and Palmiet Rivers, below N2 highway 33°22'18"S 26°28'35" E. The Berg and Palmiet Rivers flow into Settlers Dam, the source of water for Grahamstown East. The source of these waters is open pastures and pristine forest.

7.2 Appendix 2 – The watchdog role of the Kowie Catchment Campaign

"Dear KCC committee and supporters

The KCC photo monitoring team noticed on 2 August that some kind of building development was taking place on the upstream side of the former skip site, beside the Beaufort St Bridge, below the intersection with Mathew St.

I phoned the Town Planner's office today (5 Sep 07), and managed to speak to Mr Renier van der Merwe (046-603.6069/6068 / email: townplan@makana.gov.za) to ask what development is taking place. Mr van der Merwe confirmed that it is being turned into permanent taxi rank / car wash facility, and noted that the completion date is September 2007. He suggested that I should check with Building Inspector Mr Clive Christian (603 6166).

I expressed concern about the detergents and pollutants that are flowing into the river, and Mr van der Merwe agreed, noting that he has also unofficially expressed his concern about this. He wondered if this could have been an oversight. He suggested we start by talking to Clive Christian about the building plans (sewer, removal of waste, etc.). If it turns out that they are not complying with the plans, then we should talk to the Engineers Dept.

I phoned the Building Inspector, Mr Clive Christian (046-603.6166 / email: clive@makana.gov.za) and asked if there were any building plans that dealt with appropriate disposal of the waste, explaining my concern about this being an ongoing source of pollution that would affect the health of the river. He noted that nobody had thought about this before, and that there was nothing in the building plans to deal with the waste. BUT as you have just seen from his email, these apparently are in the plans - but I would say it's a good idea to just keep an eye on this!

Mr Christian said he cares about the environment, and thanked me for raising this concern. He promised to raise this at the next Progress Meeting, so that they can find a way to address this concern. He said he would ask the Mayor to place this as a special item on the agenda.

Building Inspector, Mr Clive Christian: 046-603.6166 / clive@makana.gov.za Town Planner, Mr

Renier van der Merwe: 046-603.6069/68 / townplan@makana.gov.za

“Dear Clive

I am very relieved to hear that there is a grease trap and sewer line at the new taxi rank / car wash facility on Beaufort Street!

Members of the Kowie Catchment Campaign (KCC) will be keeping an eye on their operations, and trust that they will conduct their business in a socially and environmentally responsible manner.

Please see ATTACHED KCC pamphlet - we would be grateful if you could share this with the various stakeholders at the next Progress Meeting of the taxi rank / car wash facility: i.e. the owners; the councillor involved; the Mayor (Mr Phumelelo Maxwell Kate); the builder; the LED representative of the Municipality; and the architect or consulting engineer (Stemele Bosch Africa).
For your info, the KCC is a community environmental initiative run by volunteers. We aim to promote better care for the health of the Kowie River catchment and environment. As you may be aware, Grahamstown was established on the headwaters of the Bloukrans River, which flows into the Kowie River and out to sea at Port Alfred.

Ongoing development, invasive alien plant growth and waste disposal over the years has altered and polluted our streams to unacceptable levels. Many people are unaware of the existence of these streams in Grahamstown, often called the "Kowie ditches". They also do not realize the impact of various human activities and how this affects the health of our community and of people living downstream.

Social, economic and even political decisions influence the state of our environment and thus the health and wellbeing of our community. The KCC sees itself as an important watchdog group, serving the interests of our broader community. We recognize that citizens have rights and responsibilities - and we play an important role in keeping each other accountable. By fostering strong civic engagement and leadership within our community and municipality, we believe we can find sustainable solutions together.

The KCC would like to keep in regular contact with you, and would welcome your input! With thanks and best wishes, Nikki Kohl (on behalf of the KCC committee)”

8. REFERENCES CITED AND OTHER USEFUL DOCUMENTS

Akharwaray, N and Atkinson, D. (2002) *Linking IDPs to Municipal Budgets, task team 8 – Corporate Governance, Budgeting and Revenue Generation - Local Government Support and Learning Network (LOGOSUL).* Department of Local Government and Housing, Northern Cape.

Atkinson D and Ravenscroft P. (2002) *Alternative Service Delivery Options for Municipalities in Rural Areas: Kamiesberg Local Municipality Case Study.* WRC Report No KV137/02. (MXA & Maluti Water). Water Research Commission.

Atkinson D, Wellman G, Xaba M (2003) *A monitoring and evaluation manual for municipal water and sanitation management.* WRC report 1287/1/03. Water Research Commission Pretoria South Africa.

Atkinson, D (compiler) with contributions and comments by McIntosh, A., Smith, K., de Visser, J. 2002. *"A Passion To Govern" Third-Generation Issues Facing Local Government in South Africa. A Think-Piece in the Interests of Public Debate on Local Government.* Compiled by: Centre for Development and Enterprise, In partnership with*:* Democracy and Governance Programme, (Human Sciences Research Council).

Atkinson, D. (2007) *Intergovernmental relations in the water services sector: A case study of Makana Local Municipality and Cacadu District Municipality*. Research Project No K8/752.

Atkinson, D., van der Watt, T., and Fourie, W. (2003) *Role of District Municipalities.* Final Report. HSRC and Eden District Municipality.

Brown, J. 2005. *Water Service Subsidies and the Poor: a Case Study of Greater Nelspruit Utility Company, Mbombela Municipality, South Africa.* CRC Working Paper No 112.

Burgess, J and Muller, N. (2007) Drinking *Water Quality Task Team Interim Report.* Rhodes University, Grahamstown.

Burke, J. (*pers.comms,* 2007) Electronic communication to Project K5/1688 Reference Group, dated 20 November 2007

Burke, J. (2007) *Integrated Water Resource Management Plan Guidelines for Local Authorities.* Water Research Commission Project No. K8/116. http://www.win-sa.org.za/iwrmp.]

Burke J (2006). *Proposed Integrated Water Resource Management Plan Guidelines for Local Authorities.* Water Research Commission Project No. K8/116 [available for downloading from http://www.win-sa.org.za/iwrmp.]

Butana, K. (30 October 2007) *"Pay up or else, council tells bad debtors (including its own councillors)"* in Grocott's Mail, p4.

Checkland PB (1989) Soft systems methodology. In : Rosenhead, J. (ed.). *Rational analysis for a problematic world.* Chichester, UK: John Wiley & Sons.

Dent, M. (2007a) *CMA Leadership Letter 67. Right sizing the CMAs.* Unpublished letter.

Dent, M (2007b) *CMA Leadership Letter 62. Implementation of IWRM needs leadership at all levels.* Unpublished letter.

Elliott, A.H. and Trowsdale, S.A. (2006) *A review of models for low impact urban stormwater drainage.* National Institute of Water and Atmospheric Research, Hamilton, New Zealand; Landcare Research, Auckland.

Gambiza, J. and Palmer, T. (eds.) (17 November 2004) *"Makana Municipality Local Environmental Action Plan: Comprehensive Audit Report, Part I: Water Resources and Wetlands"*

Gearey, M. 2006. *Concepts of legitimacy within the context of adaptive water management strategies.* Paul Jeffrey School of Water Sciences, Cranfield University, Bedfordshire, MK43 0AL, UK March Elsevier.

Global Insight (2005) *Regional Economic Focus* (ver.6.11.3)

GWP (2005). *Global Water Partnership toolbox.* http://www.gwptoolbox.org/.

Grahamstown Residents' Association. 2 February (2007) *Memorandum from the Grahamstown Residents' Association (GRA) to Makana Municipality on Current Problems in Infrastructure and Service Delivery.*

Grodzinska-Jurczak M, Tomal P, Tarabula-Fiertak M, Nieszporek K, Read AD (2006) *Effects of educational campaigns on municipal solid waste management in Juslo City (Poland).* Resources, Conservation and Recycling 46. 182-197. ELSEVIER.

Hans, T. (29 January 2008) *Ongoing refuse saga: municipality responds to complaints.* In Grocott's Mail, p3.

Haigh, E. H. (2007) Talk entitled: *Municipal Management & Integrated Water Resources Management.* Delivered at a Water for Local Needs Conference.

HSRC (May 2004) Review of Schedules 4 and 5, unpublished report for DPLG.

Karar, E. (2003) *Governance in water resources management: progress in South Africa*. (WWF3: INBO session 20.03.03)

Lotz- Sitstka H. Hamaamba T, Kachilonda D. Zondane P., Kula T., Olvitt, L., Timmermans I. (2004) *Analysis of the Education & Training Needs Implied.* In: Selected Key Environmental Legislation: An analytical study conducted for the Department of Environmental Affairs and Tourism Available from the Rhodes University Environmental education web site

Mazibuko G and Pegram G (2004) *Evaluation of the Opportunities for Cooperative Governance between Catchment Management Agencies and Local Government.* Water Research Commission, Pretoria, South Africa.

McIntosh, Xaba & Associates (2006) *Eastern Cape Competitive Advantage Assessment and Training Support Project.*

Mitchell, V. G. (2004) *Integrated Urban Water Management: A review of current Australian practice. Australian Water Conservation and Reuse Research Program.* CMIT –2004-075

Monyai P (2003) *Capacity building needs of rural municipalities in the management of water and sanitation services: case studies from the Eastern Cape.* WRC report 991/1/03.

Moriarty, P., Butterworth, J., and Batchelor, C. (2004b) Integrated Water Resources Management and the domestic water and sanitation sub-sector. IRC Thematic Overview Paper, Delft, the Netherlands. www.irc.nl/page/10431.

Motteux, N. (2001) *The development and coordination of Catchment Fora through the empowerment of rural communities*. WRC Report 1014/1/01.

Muller, N. and Burgess, J. (2007) *Drinking Water Quality Task Team. Interim Report.* Rhodes University: Grahamstown.

Mullins, R.L.G. (2007) *Grahamstown's Water Supply – a brief history and present state.* Unpublished report. Kowie Catchment Campaign.

Pierce, S.M. (2003) *The STEP Mapbook*, part of the STEP Handbook.

Pollard, S and Du Toit, D. (2005) *Achieving Integrated Water Resource Management: the mismatch in boundaries between water resource management and water supply.* International workshop on African Water Laws: Plural Legislative Frameworks for rural Water Management in Africa, Johannesburg.

Rossouw AMM & Crous PC (2000) *Rapid capacity building for water and waste management at local authority and district council level.* WRC report 982/1/00

Shah T &. Van Koppen B (2006) *Is India ripe for integrated water resources management? Fitting water policy to the national development context.* Economic and Policy Weekly August 5 2006.

Smith, J.A and Green, J.M. (2005) *Water service delivery in Pietermaritzburg: A community perspective.* Water SA Vol 31, No 4. http://www.wrc.org.za

Smits, S and Butterworth, J. (2006) *Literature review: Local Government and Integrated Water Resources Management.* IRC International Water and Sanitation Centre, Delft, the Netherlands.

van Roon, M. (2006) *Water localisation and reclamation: Steps towards low impact urban design and development.* Journal of Environmental Management. School of Architecture and Planning, University of Auckland.

Young, J. and Court, J. (2007) *Problem and objective tree analyses. Research and policy in development.* www.odi.uk.org accessed

Water Information Network South Africa (31 May 2007) *Provincial Overview of 2006/7: Highlights and Challenges.* Compiled in collaboration with the Department of Water Affairs (Sector Collaboration Unit)

Acts and Strategies

Disaster Management Act (Act 57 of 2002)
Division of Revenue Act (DORA)
Intergovernmental Relations Framework Act (Act 13 of 2005)
Local Government Finance Management Act (Act 56 of 2003)
Local Government Property Rates Act (Act 6 of 2004)
Municipal Demarcation Act (Act 27 of 1998)
Municipal Structures Act (Act 117 of 1998)
Municipal Systems Act (Act 32 of 2000)
Municipal Structures Amendment Act (Act 33 of 2000)
National Environmental Management Act (Act 107 of 1998)
National Water Act (Act 36 of 1998)
Water Services Act (Act No 108 of 1997)
White Paper on Local Government (WPLG, March 1998)
Cacadu District Municipality (2007) Integrated Development Plan 2007 – 2012
Environment Conservation Act (ECA, Act 73 of 1989

Department of Provincial and Local Government (2006) *IDP Skills Program Learner Guide.* developed by Celeste Rosslee-Venter (Baobab Consulting and Training)
DWAF. (2007) Guidelines for Catchment Management to Achieve Integrated Water Resources Management in South Africa . Department of Water Affairs and Forestry, Pretoria, South Africa.
DWAF. (October 2006). *Waste Discharge Charge System Phase 3 Strategy for the Waste Discharge Charge System DRAFT.* Version 1.9. Department of Water Affairs and Forestry, Pretoria, South Africa.
DWAF. (August 2006) Strategy for Retention and Development of Key Staff in the Water Services Sector in the Eastern Cape. Prepared by Asante Management and Development Services. Department of Water Affairs and Forestry, Pretoria, South Africa.
DWAF.: Directorate National Water Resource Planning (February 2005) *Internal Strategic Perspective for the Fish to Sundays Portion of the Fish to Tsitsikamma Water Management Area (WMA 15)* Version 1. Report No. PWMA 15/000/00/0405 Department of Water Affairs and Forestry, Pretoria, South Africa.
DWAF. (September 2004) *National Water Resource Strategy* (First Edition) Department of Water Affairs and Forestry, Pretoria, South Africa.
DWAF. (August 2004) *National Water Conservation and Water Demand Management Strategy.* Department of Water Affairs and Forestry, Pretoria, South Africa.
DWAF (2001) *Managing the water quality effects of settlements.* Department of Water Affairs and Forestry, Pretoria, South Africa.
DWAF. (2003) *Strategic Framework for Water Services.* Department of Water Affairs and Forestry, Pretoria, South Africa.
DWAF. (September 1999) *Resource Directed Measures for Protection of Water Resources: Integrated Manual* Appendix Im1 24
DWAF. (January 1999) *Draft Tariff Regulations for Water Services Tariffs: A Guideline for Local Government* Department of Water Affairs and Forestry, Pretoria, South Africa.
DWAF. Eastern Cape (*undated*) *Draft Makana Report.* Department of Water Affairs and Forestry, Pretoria, South Africa.

Water Research Commission - Department of Water Affairs and Forestry (January 2007) *Integrated Water Resource Management Plan Guidelines for Local Authorities.* Project No. K8/682/1. Report prepared by J. Burke, SRK Consulting.

Water Research Commission (November 2007) *The Development of a Framework for the Involvement of Local Government in Water Resource Management, Linked to Water Service Provision.* Deliverable 6 on WRC Project No. K5/16881. A Progress Report summarizing the work accomplished till October 2007 prepared by L. Haigh and H. Fox, IWR.

Water Research Commission (February 2006) *The Development of a Framework for the Involvement of Local Government in Water Resource Management, Linked to Water Service Provision.* Deliverable 3 on WRC Project No. K5/16881. Prepared by H. Davies-Coleman, D. Hughes and Z. Zenani, IWR.

Water Research Commission (July 2003) *A Monitoring and Evaluation Manual for Municipal Water and Sanitation Management.* WRC Report No 1287/1/03. Prepared by D. Atkinson and G. Wellman, MXA.

Water Research Commission (August 2002) *Alternative Service Delivery Options for Municipalities in Rural Areas: Kamiesberg Local Municipality Case Study.* WRC Report No KV137/02. Prepared by D. Atkinson (MXA) and P. Ravenscroft (Maluti Water)

Water Research Commission (2000) *Rapid Capacity Building for Water and Waste Management at Local Authority and District Council Level.* WRC Report No 982/1/00. Prepared by AMM Rossouw and PC Crous

Makana reports and studies

Hans, T. (29 January 2008).*Ongoing refuse saga: municipality responds to complaints.* In Grocott's Mail, p3.

HSRC (May 2004) *Review of Schedules 4 and 5*. Unpublished report for DPLG.

Department of Water Affairs and Forestry, Eastern Cape (*undated*) .*Draft Makana Report.*.

KCC photographic point monitoring task team. (September 2007) *Report and Recommendations to Makana municipality. Grahamstown-Rhini CBD streams*. Unpublished report. Kowie Catchment Campaign, Rhodes University.

Makana Local Municipality (2007) *Integrated Development Plan 2007-2012.*

Makana Local Municipality (April 2007) *Water Services Development Plan.* Prepared by Engineering Advice & Services cc in Joint Venture with Maisha Development Engineers

Makana Municipality: Local Environmental Action Plan (2004) *Water Quality, Availability and Management: Implementation Proposal.*

Makana Municipality: Local Environmental Action Plan (6 October 2004) *Stakeholder Contribution to Biodiversity Framework: Project Proposal,* prepared by The Working Group for Biodiversity.

Makana Municipality: Local Environmental Action Plan (2 November 2004) *Environmental Audit Report: Waste Management, Sanitation, Water Services and Industrial Environmental Management.*

Makana Local Municipality (2004) *Promotion of Access to Information Act Manual.*

Water Information Network South Africa (31 May 2007) *Provincial Overview of 2006/7: Highlights and Challenges.* Compiled in collaboration with the Department of Water Affairs (Sector Collaboration Unit)

Von den Meden, C. (2004) *Environmental water quality in Makana Municipality, Eastern Cape, South Africa: a case study of local government responsibility for water resource management.* Honours dissertation, Rhodes University, Grahamstown. 41 pp.

(8 January 2008) *The GRA monthly monitor.* In Grocott's Mail, p5.

Notes for Proposals - Makana Municipality Environmental and Service Delivery Programme. Meeting 11th October 2006, Institute for Water Research.
Report On the 'Greening of Grahamstown' Meeting Held on 25 April 2007 at the Public Library Hall, Grahamstown, 16:00–18:30
Memorandum from the Grahamstown Residents' Association (Gra) to Makana Municipality on Current Problems in Infrastructure and Service Delivery.

Interviews and discussions (pers comm.)

Mr D Bezana, Department of Health DD: Environmental Health, 12 February 2008 (telephonic)
Mr B Matomela, DWAF Deputy Director: Sector Collaboration, 22 January 2008.
Mr D Collier, TraCTS Transformational Corporate training systems - Educator on leadership, performance management and Human resource systems for Municipalities.
Dr Mark Dent, CMA Leadership Letters. These letters arrive regularly by e-mail and have useful insights and information.
Mr D Dell, Makana Manager Cleansing Department 2006.
Mr H Dredge, Makana Director: Finance, 12 June 2007 (moved to Port Alfred)
Mr J Esterhuizen, AD: Environmental Health and Cleansing, 20 November 2007
Mr Everton, Makana, Manager of the Grahamstown Disposal Works in 2004
Ms P Hermanus, Acting AD: Technical Services – Sanitation, 6 May 2006, 19 November 2007
Prof Kate Rowntree, Geography Department, Rhodes
Prof D Hughes, Institute for Water Research, Director, 2007
Mr R Jack, DWAF Director: Planning Support, 7 December 2007
Mr X Kalashe, Makana Skills Development Officer, 13 June 2007 (LEFT)
Mr A Lucas, DWAF Acting Director: Water Regulations and Use, 7 December 2007, 6 February 2008 (telephonic)
Mr T Matebese, Makana Communications Officer, 18 October 2007
Mr G Mbambisa, DWAF Director: Water Sector Support, 7 December 2007
Mr Mzamo Vonco, WSDP Coordinator, Planning Support Sub-Directorate, 7 December 2007
Mr M Nkohla, IDP Manager, 19 November 2007
Mr W. Rowlston. Water Resources Management expert, ex DWAF, currently with Coastal and Environmental Services, 2007
Mr P Snyman, Cacadu AD: WSA Manager, 16 October 2007 (telephonic); 21 November 2007
Dr B Schreiner, 2007. Discussion document on Integrated Water Resources Management (IWRM) in South Africa, DWAF.
Mr R van der Merwe, DD: Town Planning, 19 November 2007

Useful websites

www.worldwatercouncil.org
http://www.biodiversityeconomics.org WWF and IUCN
http://www.worldwildlife.org/conservationfinance WWF-US Centre for Conservation Finance:
www.ad.unep.org.documents
www.Earthscan.Co.Uk World Water Vision. 2000. World Water Council, Earthscan Publications, London.
www.worldwaterforum.org

www.iclei.org (International council for local environmental initiatives and is where one can find LoGo information).
www.salga.net (South African Local Government Association).
www.wbcsd.org (world business council for sustainable development – waste water treatment, sanitation challenge)
http://www.unmillenniumproject.org/ (UN Millennium Project 2005)
http://www.gwpforum.org (global water partnership forum)
http://www.IAP2.org
http://www.usaid.gov/ US Agency for International Development
http://www.who.int/en/ World Health Organisation
http://www.iucn.org/ The World Conservation Union
http://www.unicef.org/ The United Nations Children's Fund

Deliverables

Davies Coleman, H. 2006. The Development of a Framework for the Involvement of Local Government in Water Resource Management Linked to Water Service Provision. Deliverable 1: Initial Report on Institutional Arrangements and Schools Training

Haigh, H.E. and Fox, H.E. in association with HJ Davies-Coleman and DA Hughes. (June 2007) *Interim Framework of implementation of Local Government.* Deliverable 4 for the Water Research Commission Project K5/16881. Subtitle: Assessment of the impact of Local Government Water Service Delivery responsibilities on the Water Resources and how these impacts could be ameliorated for the LG to contribute to WRM and the WMA in within which it is situated.

Haigh, H.E. and Fox, H.E. (2007) The Development of a Framework for the Involvement of Local Government in Water Resource Management, Linked To Water Service Provision: Deliverable 5 for Project K5/1688

Haigh, H.E. and Fox, H.E. (2007) *Assessment of the feasibility that a Category B Municipality can prepare and implement an Integrated Water Resources Management Plan.* Deliverable ? WRC Project K5/16881

Haigh, H.E. and Fox, H.E. (2007) A Progress Report summarizing the work accomplished till October 2007. Deliverable 6 of Project K5/16881

Haigh, H.E. and Fox, H.E. (2007) *Assessment of the feasibility that a Category B Municipality can prepare and implement an Integrated Water Resources Management Plan.* Deliverable 6 WRC Project K5/1688

Minutes

Minutes of the inaugural meeting of the Reference Group on the development of a framework for the involvement of Local Government in Water Resource Management linked to Water Service Provision. 13th July 2006

Steering Committee Report for 7th March 2007 and Deliverable 3: Progress Report on Implementation of IWRM at Local Government Level 2006

Makana Municipality Ward 4 Minutes, Ward Committee Meeting 10th October 2006

Report On the 'Greening of Grahamstown' Meeting Held on 25 April 2007 at the Public Library Hall, Grahamstown, 16:00–18:30

LoGo Water 2007 Report of Symposium: Water for Local Needs - The Contribution of Local Governments to Integrated Water Resources Management (IWRM) - Benoni, Greater Ekurhuleni

Metropolitan Municipality, South Africa 9 and 10 July, 2007 Hosted by the Greater Ekurhuleni Metropolitan Municipality

Minutes 28th May 2007 Discussion Meeting with Doreen Atkinson

Minutes of the KCC Meeting held in the Albany Museum Education Department on Thursday 31 January 2008

Minutes of the KCC Meeting held in the Albany Museum Education Department on Thursday 13 September 2007.

Minutes of the KCC Meeting held in the Albany Museum Education Department on Thursday 12 March 2007.