MAKANA MUNICIPALITY

WATER QUALITY, AVAILABILITY AND MANAGEMENT

IMPLEMENTATION PROPOSAL

Introduction

South Africa is a semi-arid country and, as in the rest of Africa, "urbanization has led to deterioration in the quality of water in streams and lakes near urban centres" (Moyo and Phiri, 2002). Deteriorating water resource quantity and quality is likely to become a serious restriction to future socio-economic development (Peart and Govender, 2001).

In South Africa there are two major pieces of water legislation: The South African National Water Act (No. 36 of 1998) (NWA), which deals with water resource management (WRM) and the South African Water Services Act (No. 108 of 1997) (WSA), which deals with water service provision (WSP). The institutional arrangements that support the implementation of this legislation are devolved across all three tiers of government: national, regional and local (DWAF, 2004).

At the National Government level, the Department of Water Affairs and Forestry (DWAF) acts as the "public trustee" to ensure that "water is protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner for the benefit of all persons…" (Chapter 1:3(1)). The Act goes on to emphasize the promotion of environmental values and a focus on regulation (Chapter 1:3(2) and (3)). At a regional level, water resource management is currently undertaken by regional DWAF offices, but their powers and responsibilities are being transferred to Catchment Management Agencies (CMAs) (NWA, Chapter 7) which will administer 18 water management areas (WMAs) (DWAF, 2004). At the local level, water resource management will be undertaken by Water User Associations (NWA, Chapter 8), with additional stakeholder input from Catchment Forums. In contrast, the Constitution (Schedule L Part B) devolves responsibility for water service provision to local government in the form of municipalities. The Water Services Act establishes water services authorities (WSAs) to manage water services provision, and local authories can act as WSAs. Added challenges are posed by municipal and WMA boundaries that do not coincide, and the lack of attention to the linkages required for sustainable WRM to support water service provision, and little guidance given to the links that should be forged between WUAs, Catchment Forums and municipalities. This implementaipon plan aims to facilitate the efforts of Makana Municipality to engage effectively with WRM issues.

Poor water quality:

a) Water quality is poor in the Bloukrans River downstream of Grahamstown sewage treatment works (STW). These issues could become a problem in Alicedale.

b) Salinity is naturally high but is being worsened by farm dams with associated evaporation, and outflows from STW and industries.

d) Nutrient enrichment is a problem, and the role of informal settlements, STW and fertilizers needs to be assessed.

Water availability:

There is uncertainty about the kinds of data that are available and how they should be used for planning such as:
a) development planning (increasing housing and piped water, transition to water borne sewage, any proposed industrial developments) and
b) drought planning (uncertain and low rainfall area).

Ecosystems health:

a) In most of Makana municipality, 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.
b) Habitat condition is also affected by alien invasive plants.

Human Capacity:

Currently, 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.

Currently data are kept in many places and it is difficult to access and integrate for use in planning and management.

Introduction

The 'water resource' is defined by the National Water Act (Act 36 of 1998) to include all water in the hydrological cycle. At the national level this includes rainfall and runoff; and water in ecosystems including rivers, lakes or dams, wetlands, estuaries and groundwater. At the Makana level, this includes rivers, dams and groundwater, with small pockets of wetlands, although the latter have not been mapped or studied.

Three main aspects to the water resource include water quantity (flow and storage); water quality (chemistry and biotic indicators); and habitat structure. Water quality related decisions invariably involve water quantity effects and vice versa. These in turn relate to water use decisions such as discharge of effluent and development of surface water resources. Conversely, changes in flow patterns, re-routing of water resources and changes to water allocation profiles may all affect water quality.

The core indicators for freshwater resources reporting include, amongst others:

- Total surface water demand - relates directly to the monitoring required with *Resource Directed Measures (RDM)* which provide descriptive and quantitative goals for the state of the water resource; and
- Effectiveness of water resource management - relates directly to the auditing required with *Source Directed Controls (SDC)* which specify the criteria for controlling impacts such as waste discharge licences and abstraction licences.

This section of the LEAP Implementation Plan deals with the Resource Directed Measures.

Issues identified by the IDP Process

Grahamstown

- lack of public toilets in the city centre, with consequent misuse of pavements and runoff.
- Lack of a green belt development in the greater area.
- Restoration of the water catchments.

Alicedale

- State of the New Years Dam.

Rural area

- Overgrazing with consequent runoff problems.
- Water pollution.

Issues identified by the LEAP Process

The STAKEHOLDER issues relating to ecosystem health included:

- Pollution of the Bloukrans River: concern was voiced over the impact of the sewage treatment works, and the dumping of rubbish in or near the river.
- Indigenous vegetation removal: concern over the impact of this on the riverine ecosystem.
- Alien vegetation: the increase in alien vegetation in the riparian zone was seen as a threat to the ecosystem.
- Inappropriate use of water (domestic and irrigation) and the effectiveness of the sewage system.
- The dumping of rubbish into the rivers; the location of Municipal dumpsters near the rivers with runoff causing pollution; the tar dumping made near the N2 highway above the confluence of the Palmiet and Berg Rivers, with consequent runoff into the Palmiet.
- Stormwater drainage and management, especially in the Rhini and Grahamstown areas.

Stakeholder issues categorized under Human Health are *not* addressed in this plan except in the context of water quality data from the water resources. Similarly, issues categorized under Water Services are addressed in the Sustainable Development Framework. Indigenous and alien vegetation issues are addressed in the Biodiversity section of the LEAP Implementation Report.

Long-term Objectives

1) An understanding by both Makana Municipality and stakeholders of water resources and water resource management; and therefore the implementation of the Resource Directed Measures and Source Directed Controls. DWAF, as custodians of water resources, hold the responsibility for providing Makana with the latest developments and introduction of new legislation. However, education (new developments and their implementation within Makana) is seen as a future requirement for both technical and managerial staff, and stakeholders. This should also lead to participation of stakeholders with the Municipality in determining the required Ecological Health Class of the rivers, dams and wetlands in Makana. The formation of the Catchment Management Agencies will eventually facilitate this process.

2) Effective Makana water quality and quantity data management. Although DWAF are responsible for water resource quality monitoring, greater collaboration seems necessary between the Municipality, DWAF and industry, for more effective management of the water resource quality. A centralised and coherent data management system for collation and reporting of monitoring data would make accessing and interpreting data less complicated and possibly more efficient in monitoring trends, particularly on water resources.

3) A more clearly defined link between the Water Reserve versus the Water Service Provision in Makana. A hydrological model of present conditions, and an ecological Reserve determination are necessary but the latter satisfies longer term planning. Commensurate with this is the need for a model to estimate a Water Services plan, linked to available water quantities and demands, both present and future. Estimates to include domestic, educational (in particular Rhodes University's projected numbers of entrees), industrial and agricultural growth and therefore water demands.

4) The effective implementation of tariff by-laws to facilitate water resource management, particularly within the Grahamstown area where effluents are all treated by the Sewage Treatment Works.

5) Effective monitoring of water extraction from farms and dams. Assessment of existing lawful use of water including that used for agricultural use is essential.

6) Improvement in the Bloukrans River water quality, from the present Poor to Good ecosystem health class. This will necessitate greater Source Directed controls within Grahamstown and the agricultural area surrounding the River where runoff is considerable.

7) The introduction and use of a structured, holistic (environmental water quality) approach to water quality resource management within Makana, as detailed within the Comprehensive Report. This includes biomonitoring and toxicology linked with physico-chemical data collection.

Biomonitoring within the Bloukrans River, in particular, should continue, led by the stakeholder Kowie Catchment Campaign. Both the Makana Biodiversity Centre, Albany Museum, and the UCEWQ-IWR, Rhodes University, are presently willing to make their expertise available for such monitoring.

Biomonitoring should be initiated in the Bushmans River above and below Alicedale to monitor possible effects the town, developing golf course and tourist facilities, and nearby tannery may have on water resource quality.

8) The introduction of ecotoxicological studies around the Sewage Treatment Works, Grahamstown. To be linked to biomonitoring and physico-chemical data (point 7). DWAF are in the initial stages of implementing the DEEEP process (direct environmental effect potential) which specifically targets the management of complex mixtures. It is due for implementation nationally June 2005, by DWAF water quality managers.

Short-term targets

1) An ecotoxicological risk assessment, based around Grahamstown and its Sewage Treatment Works. Toxicity tests using the standard laboratory organism Daphnia pulex (water flea) are ongoing by UCEWQ-IWR, within the context of the LEAP. The tests will be complete by September 2004 and assess and compare the toxicities to aquatic biota (if any) of the influent and effluent of the Grahamstown STW. Present results indicate the tests are a valuable indicator for identifying when toxicants are not being broken down or absorbed within the STW. The test results will be presented within the LEAP Comprehensive Report.

In the context of holistic environmental water quality, as suggested before, toxicity tests should be continued with STW effluent, compared to influent. The DEEEP process will also introduce compulsory industrial toxicity testing by June 2005, where industry will be responsible for tests and the costs therein. Data should be kept by the Municipality, as suggested with all other data, in an accessible place for all interested parties. The frequency for such tests depends on the industry(s) within Makana, and the requirements by DEEEP.

DECEMBER! Tests to be completed with STW dam and to be compared with neighbouring dairy runoff - *Daphnia pulex.*

The development of hydrological and water use models for Makana.

An assessment of the natural salinity levels within the water resources.

Water quality and quantity data management by [DWAF and therefore] Makana Municipality.

Env education Workshop An understanding by both Makana Municipality and stakeholders of water resources and water resource management; and therefore the implementation of the Resource Directed Measures and Source Directed Controls.

New equipment for pH and turbidity monitoring at the purification works in Alicedale has been budgeted for by the Municipality.

The Makana area needs a water reserve assessment. This should not include the Fish River itself, although it should include water extracted into the area from the Fish River. More information regarding the reserve determinations is given in the ecological Reserve determination procedure (DWAF 2002) and in the handbook by Palmer et al., 2004. To assess the Makana area, 4 experts (fish, invertebrate, hydraulics and hydrology) would determine the needs of the 4 main rivers within Makana, over 2 days

Alternatively, a hydrologist could be commissioned to design a model of the Makana area that would simulate present conditions. This model would focus on water quantity and include the present main water users, including present allocation and licences; irrigation and assessment of distribution of water from all dams within the area; and Bloukrans River return flows. The model can then be used to predict the future water demands of Makana using the estimated growth points that are presently not catered for

in future estimations of consumption. This includes the golf course and tourist development at Alicedale, and the population growth and water demands presently under review at Riebeck East. The cost of this model development is estimated at R40 000. The expertise required to complete this model is within Makana, at the Institute for Water Research, Rhodes University. Most of this information could also be used in an ecological Reserve assessment.

The Free State DWAF biomonitoring programme within the River Health Programme has mapped extraction by farm pumps very successfully via GIS, in collaboration with the Department of Nature Conservation. Using excess time during game counts, helicopter surveillance has been noted on rivers presently within the biomonitoring area at the same time as alien vegetation surveillance, together with the state of dams and weirs. With the profusion of game farms within Makana, the very active Working for Water Programme, and the re-vamped Department of Nature Conservation in the Eastern Cape Province, it seems a similar co-ordinated effort by Makana Municipality to regularly map the Makana area would be possible, with little cost to Makana Municipality.

Contact details

The EWQ approach, plus biomonitoring and toxicology research and teaching: Unilever Centre for Environmental Water Quality, Institute for Water Research, Rhodes University. Contacts are Drs Nikite Muller and Heather Davies-Coleman. Tel 064 603 8532.

Biomonitoring and water quality research and teaching: Makana Biodiversity Centre, Albany Museum. Contacts are Dr Jim Cambray, Dr Ferdi de Moor, Ms Helen James, Mbongeni ???? . Tel 046 622 2312

Kowie Catchment Campaign

Water quality physico-chemical data: DWAF offices, Port Elizabeth. Contact person Pieter Retief. Tel 041 586 4884.

Hydrological modelling: Institute for Water Research, Rhodes University. Contacts are Prof Denis Hughes. Tel 046 603 8532.

Ground water data: DWAF offices, Port Elizabeth. Contact person Jane Baron. Tel 041 586 4884

Surface gauging, DWAF offices, Cradock. Contact person Piet Oosthuizen 048 8813006. National monitoring bi-annual: Hannes Calitz 043 604 5400.

Groundwater data collection: send email to DWAF Head Office, email address georequests@dwaf.gov.za.

Waste disposal: DWAF offices, East London. Contact persons Andrew Lucas or Vien Kooverji 043 7223805.

Bulk water supply and infrastructure in the East Cape. DWAF offices, Cradock. Contact person Dirk Crafford .

BUDGET

Water use model - R20 000.

Ecological Reserve Determinations - R120 000

Toxicity tests - R800/test, including personnel and analyses and interpretation of data.

Biomonitoring - responsibility of the Municipality (transport and possibly consultancy fees), although collaboration with the Kowie Catchment Campaign and Rhodes University, in particular the UCEWQ-IWR, may facilitate cost sharing. The Water Boards may be a source of funding. Collection and interpretation of data require expert knowledge. However with the future appointment of further Environmental Officer(s) within Makana by DWAF or DEAET, this expertise can be transferred to the Environmental Officer(s) and others within the Makana Municipality. Similar training of invertebrate biomonitoring techniques have been extensively introduced to the Knysna Municipality by a concerned citizen of Knysna at little cost to the Municipality.