

# Water Resources Adequacy

## Raw Water Resources Development

The organisation continues to source raw water primarily from twelve (12) dams on three (3) major water resource systems, namely, the Mgeni System, the North Coast System and the South Coast System. Registered raw water volumes are shown in **Table 13**.

In line with future growth projections, Umgeni Water in close collaboration with its major customers, provincial stakeholders and the Department of Water Affairs, identified future resource developments that are needed. **Table 13** shows the planned resource developments to 2030.

In view of the significant lead times that DWA (as the custodian of the country's water resources) requires to plan, design, construct and commission major water

resource development projects, Umgeni Water further identified and planned smaller dams with its customers as a means to secure supply to rural areas.

**Table 13: Current Water Resources Abstractions and Planned Schemes**

System	Current Raw Water Resource Abstractions	10 <sup>3</sup> m <sup>3</sup> /d	Resource Schemes Planned	Date Needed	Timing	Responsibility
Mgeni	Midmar Dam, Nagle Dam, Albert Falls Dam, Inanda Dam	1,085	Phase 2 Mooi-Mgeni Transfer Scheme: Spring Grove Dam	2007	Behind Schedule	DWA
North Coast	Hazelmere Dam	45	North Coast Supply System: Raising of Hazelmere Dam	2012	Behind Schedule	DWA
	Mdloti River	1.4	Sikoto Dam	2010	Behind Schedule	UW
	Mvoti River	16	Mvutshane Dam	2012	On Schedule	UW
			Lower Mvoti Regional Scheme: Welverdiend Dam	2020	Behind Schedule	DWA
			Upper Mvoti Regional Scheme: Mvoti-Poort Dam	2025	On Schedule	DWA
South Coast	Nungwane Dam	26.5				
	E J Smith Dam, Umzinto Dam	12.0	Mhlabatshane Dam	2010	Behind Schedule	UW
	Mkomazi River Well points	7	Phase 1 Mkomazi Water Project: Smithfield Dam	2010	Behind Schedule	DWA
			Lower Mkomazi Bulk Water Supply Scheme	2019	On Schedule	UW
	Mtwalume River Well points	7	Upper Mzimkulu Regional Scheme: Mzimkulu Dam	2030	On Schedule	DWA
Other	Ixopo Dam	1.80				

## Raw Water Resources Adequacy

Umgeni Water constantly monitors the status of freshwater resources to assess adequacy to sustain the organisation's bulk potable water business.

Mindful of the finiteness and growing scarcity of freshwater resources, Umgeni Water continues to manage its existing abstractions with the utmost diligence.

Alternative source investigations assist with identifying the most sustainable long-term water resource mix for the region. The past year's progress included:

- Completion of a pre-feasibility investigation of a large-scale desalination plant for the eThekweni Metropolitan Municipality, and initiation of the detailed feasibility phase,
- Continuation of the reuse investigation at the Darvill Wastewater Treatment Works, and
- Involvement in eThekweni Metropolitan Municipality's reuse investigation with the intention of combining the two reuse projects into one regional initiative.

In addition, research into climate change was undertaken to assess impacts on future resource availability and inform adaptation strategies.

## Diversifying the Water Resources Mix

### Desalination of Seawater

Umgeni Water is investigating the viability of constructing a large scale desalination plant in the eThekweni Metropolitan Municipality as a possible alternative to the proposed Mkomazi Water Project. The estimated ultimate capacity of the plant is 450,000 cubic metres per day (164 million cubic metres per annum), making it potentially one of the largest seawater reverse osmosis (SWRO) plants to ever be built.

The past year saw completion of the pre-feasibility study, which considered potential location, cost, environmental implications, and capacity of recipient water supply infrastructure. Preliminary investigations indicate that 150,000 of the 450,000 cubic metres per day could be injected into the Wiggins System at the Water Treatment Works site whilst the balance could be injected into the Central Aqueducts.

An economic comparison, at a pre-feasibility level of detail, indicated no discernable difference between this desalination plant and the alternative Mkomazi Water Project. However more detailed investigations of both options need to be undertaken to enable an improved accuracy in the comparison of the options.

Work in the past year also included collaboration with Australian desalination experts which has informed planning of the feasibility study for the desalination plant.

## Darvill Wastewater Reclamation

Umgeni Water is currently investigating the option of treating domestic sewage from its Darvill Wastewater Treatment Works to potable standards.

The proposal is to treat and return potable water into the distribution system at Umlaas Road, which can then be used to augment the supply to the Western Aqueduct and serve the high growth areas along the western corridor of the eThekweni Metropolitan Municipality.

This option will provide water higher up in the system thereby using gravity to increase the supply flexibility. The traditional option is reliance on pumping from Durban Heights Water Treatment Works.

In the past year, several studies relating to infrastructure, pre-feasibility environmental studies as well as treatment technology options were started and have informed future work. Work planned as part of a "multiple barrier" treatment philosophy includes the installation of Membrane Bioreactor (MBR) pilot plants at the Darvill Wastewater Treatment Works. Installation and testing will take place over the next two years in partnership with the Water Research Commission.

In parallel, Umgeni Water is investigating the social and environmental implications of wastewater reclamation and has already established an environmental focus group with key stakeholders.

## Water Resources Adequacy continued

The reuse or reclamation of wastewater is becoming a strategically important water resource alternative in the light of increasing stress on freshwater resources.

Umgeni Water also currently owns an 18.5% share in the Durban Wastewater Recycling Plant (capacity of 40,000 cubic metres per day) which treats domestic sewage to near potable standards for industrial use.

### Climate Change and Impacts on Raw Water Sustainability

Umgeni Water commenced investigation into the impacts of climate change on water resources, as early as 2006. Its intention was to gather more information on the quantum of potential impacts, especially at the water resources operating level, such that it could develop timely adaptation measures.

The assessments commenced with the Mgeni catchment due to its criticality in supplying one of South Africa's most important economic hubs, namely, the N3 development corridor between the Mgeni Municipality and eThekweni Metro, which then branches out to the N2 North and N2 South Coastal development corridors.

Umgeni Water developed a modelling framework (Figure 13) to guide its efforts. The process involved firstly setting up a daily hydrological model at a finer resolution than ever before to simulate the water resources. The strengths of this model lie in its ability to model the actual physical processes that occur in the hydrological cycle. Considerable effort was expended in ensuring accurate

input data describing rainfall patterns, land cover and its water use patterns, irrigation, reservoir abstractions, wetlands, soils, and evaporation which were configured as a base scenario in the hydrological model.

Simulations from ten (10) General Circulation Models representing numerous possible rainfall scenarios and increased evaporation rates were routed through the base hydrological model to simulate possible future streamflow scenarios for the Mgeni catchment.

The resulting streamflow scenarios were used in a water resources simulation model of Midmar Dam to determine the potential impact of climate change on water yield.

Results of the assessment, show a marginal decrease in streamflow of about 10% in the immediate (2011-2030), planning horizon and increases in streamflow in the intermediate (2046-2065) and distant futures (2081-2100).

Indications are that these streamflow changes are also amplified when translated into

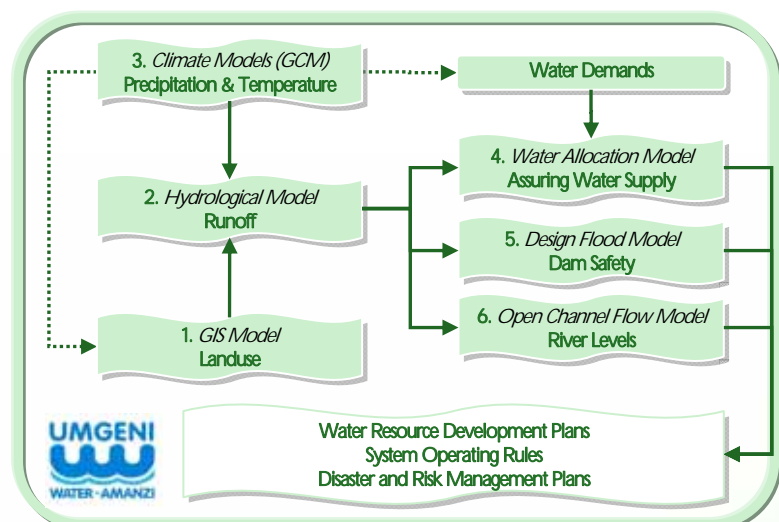
yield with an average potential increase in yield at Midmar Dam of fifteen (15), thirty (30) and fifty percent (50%) for the three horizons respectively.

The fifteen percent (15%) increase translates into an additional 70,000 cubic metres per day, which is then potentially available for supply from Midmar Dam at an assurance of ninety-nine (99%). This additional water has the opportunity to impact positively on Umgeni Water's operations and long term water supply plans.

Notwithstanding this potential for a positive water resources outlook associated with climate change, adaptation measures relating to increased magnitude and variability of water resources, for example the potential for increased flooding and other dam safety aspects, still need to be considered.

Future work is to extend the yield modelling to include all main dams in the Mgeni catchment, and expand the climate change modelling to adjacent key catchment areas, notably the Mooi and Mkomazi.

Figure 13: Modelling framework to Determine the Impacts of a Changing Climate on Water Resources



# Conserving our Natural Resources

These results are based on the current best available data and science, but it is important to qualify that climate change modelling is still an emerging field. Shortcomings naturally include the challenge to replicate the complexity associated with natural systems in models. Large differences between different climate change models are being mitigated by using multiple models. Current findings are based on ten (10) climate models that were identified through partnerships and collaborations with national and international professionals and research institutions.

This collaboration is critical and will continue to ensure Umgeni Water keeps abreast of new developments in modelling technology and continues to improve confidence in results.

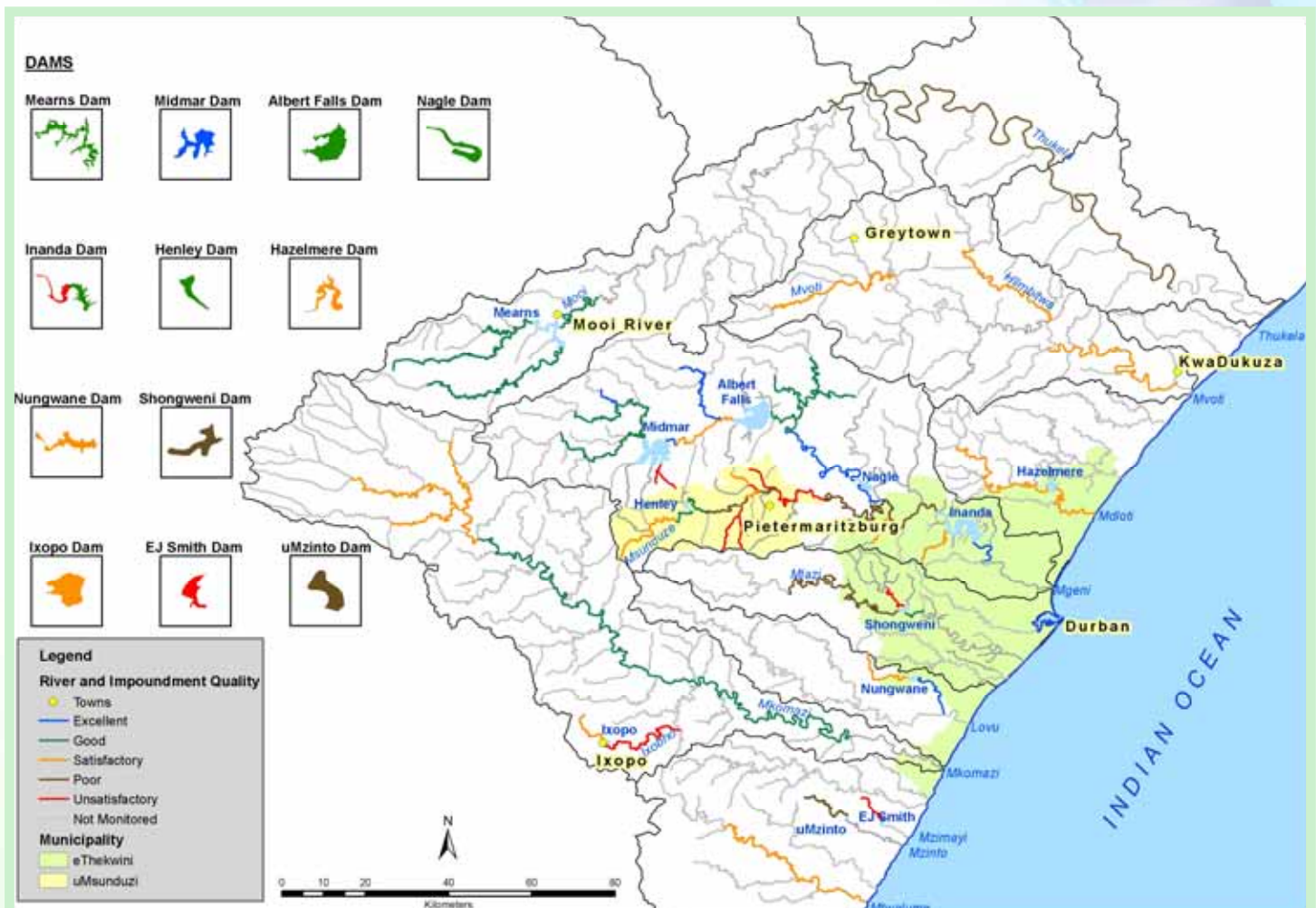
Resource quality was assessed against raw water quality objectives that had been set for each water treatment works system. Overall, the quality of raw water resources was satisfactory.

## Raw Water Quality Adequacy

Umgeni Water continues to monitor changes in raw water quality to ensure appropriate water treatment response and effectiveness. **Figure 14**, shows the raw water quality status for the year 2009/2010.

Water quality in the dams is largely impacted by the runoff and discharges in the catchment areas. River quality in the upper catchment areas was generally good. Areas that were unsatisfactory were the E J Smith dam that supplies Mzinto Water Treatment Works and the upper reaches of Inanda dam, although the latter did not impact on the quality of water abstracted at the dam wall for the Wiggins Water Treatment Works.

**Figure 14:** Water Quality Status of Rivers and Dams in 2009/2010



## Catchment Management

### Biodiversity Conservation of Dams

Msinsi Holdings, a wholly owned subsidiary of Umgeni Water, continued to play a vital role in the environmental management of the land and wildlife around water supply dams. The reserves managed by Msinsi include those at Albert Falls Dam, the Nagle Dam, the Inanda Dam, Shongweni Dam, and Hazelmere Dam. There are seven (7) different vegetation types in these reserve areas many of which are endemic to KwaZulu-Natal, including four (4) which are critically endangered.

These reserves afford an opportunity to contribute to the protected areas network in a highly transformed yet important provincial development corridor between Pietermaritzburg and Durban. The rehabilitation programme during the year included the removal of alien plants and the continued management of the ecological carrying capacity of the endemic game species that were introduced into the reserves.

Msinsi's careful management of game species has enhanced the game viewing experience at the reserves, and provided an excellent rate of return as the current value of game stands at approximately R 4.6 million.

### Preventing Pollution Within the Purchase Line of Dams

Msinsi has continued to manage the land within the purchase line of the relevant dam sites to minimise contaminated runoff into the water resource. This has been effected through:

- Ensuring that infrastructure development takes place with minimum impacts on the environment,
- Ensuring no agricultural activities take place within the purchase line,
- Controlling visitor activities on the water surface and within the purchase line, and
- Ensuring there is no illegal dumping by industries.



# Conserving our Natural Resources

## Community Recreation

The areas around the dams are an important recreational resource and Msinsi continued to facilitate this through:

- developing and maintaining picnic areas and ablutions,
- demarcating and providing accommodation (camps and chalets),
- providing safe areas for launching of boats, and
- ensuring safe water surface activities.

These reserves also continued to support national and international sporting events including the Dusi Canoe marathon at Inanda Dam, the flat water canoe sprints at Nagle Dam, and the bass fishing tournaments at Albert Falls Dam and Inanda Dam.

## Local Community Development

Msinsi has done significant work with financing projects through its community levy fund, including the building of classrooms, the provision of computer equipment for schools, and the establishment of community gardens.

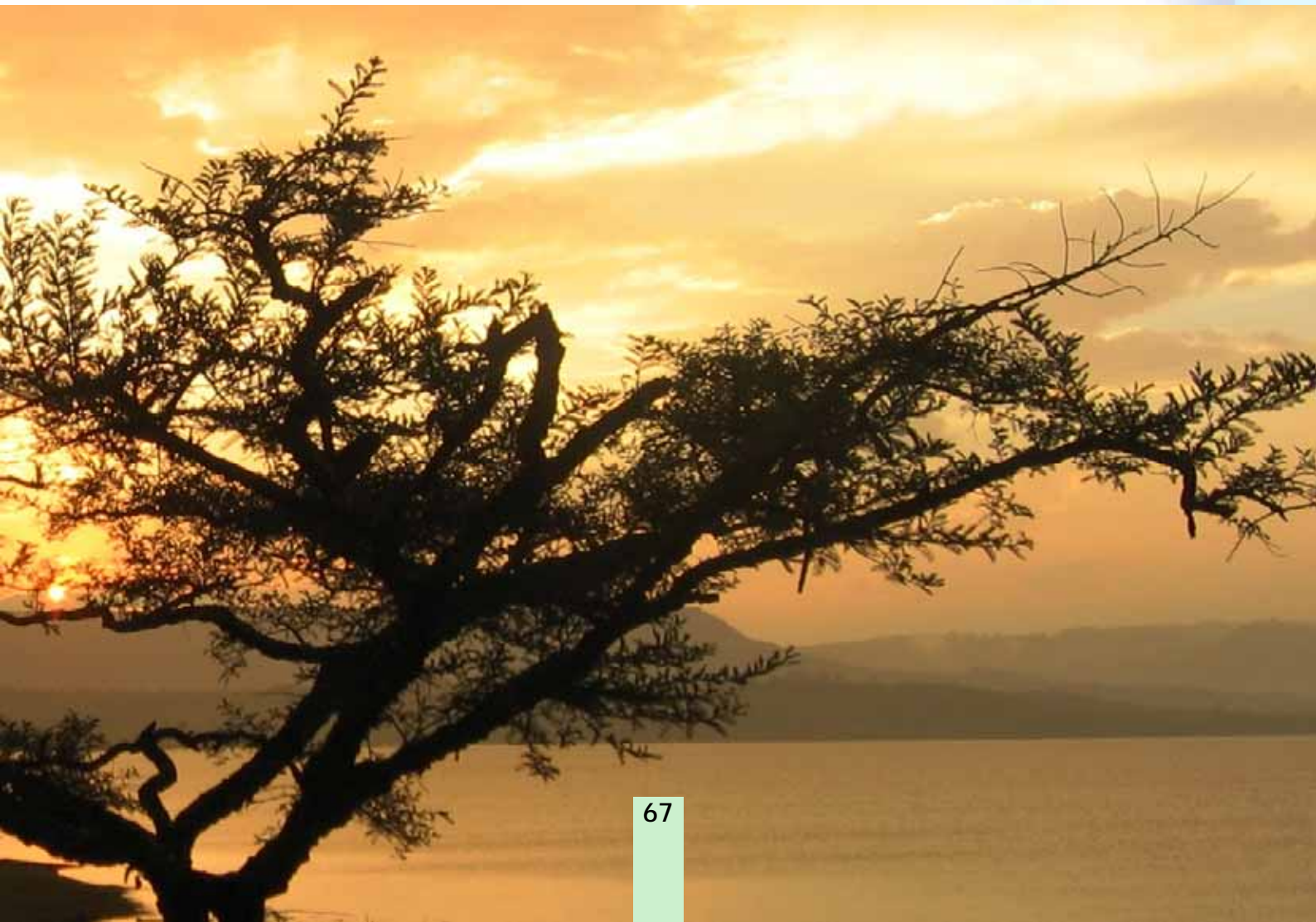
In addition, work in the field of Environmental Education has been provided through the Pride of Shongweni programme in conjunction with the Wilderness Foundation.

Through this programme hundreds of high school learners were brought to Shongweni Dam during the year for environmental education courses and trails.

The Spirit of Adventure Programme at Shongweni Dam and the Forest Lake Programme at Albert Falls Dam further brought in thousands of learners during the year to participate in adventure and leadership training.

Msinsi has a dedicated Environmental Learning Centre, with overnight accommodation at Albert Falls Dam, for the use of large school groups.

The company is in the process of finalising the establishment of the Msinsi Trust, to be funded from a community fee that is levied on all vehicles entering any Msinsi reserve and will provide funding for community development projects.



## Water Resources Adequacy continued

### Aquatic Weed Management

Water Hyacinth (*Eichhornia crassipes*), Water Lettuce (*Pistia Stratiotes*) and Kariba Weed (*Salvinia molesta*) have been found in several raw water supply catchments, notably Midmar Dam, Ixopo Dam (Xobho River), Nagle Dam (Mpolweni River) Inanda dam (Mgeni River and Msunduzi River) and Albert Falls Dam (Mgeni River).

These plants pose a major risk to the water resources, impacting both on the quality and water loss through increased evapo-transpiration. Ongoing control is therefore vital to limit their impacts.

A number of interventions were undertaken during the year to control these weeds. Their control status in 2009/2010 was as follows:

- Water Hyacinth presence in the Mgeni inflow to Midmar Dam is under control.
- Re-colonisation of Water Lettuce and Kariba Weed has been limited in Albert Falls catchments through biocontrol.
- Several farm dams that have been re-colonised by Water Hyacinth in the Mpolweni Stream (upstream of Nagle Dam) have been flagged with land owners.

- Rapid re-colonisation of Water Hyacinth in the Msunduzi River, Mgeni River and Inanda Dam occurred, and is being managed by ongoing eradication.
- Rapid re-colonisation of Kariba Weed in the Mpushini Stream (Msunduzi catchment) was successfully controlled through the release of biocontrol agents.
- Water Hyacinth presence in the EJ Smith Dam was successfully controlled after several interventions.

Umgeni Water also completed considerable terrestrial alien plant clearance work, as part of the **Working for Water** Programme it has implemented for DWA in 2009/2010, which is described in the previous chapter of this annual report.



## Leveraging Infrastructure Assets for Energy Management

Energy management is a critical aspect of Umgeni Water's environmental sustainability plan. In the past year, the organisation focused on interventions that would lead to more efficient electricity usage, resulting in reduction in both cost and environmental impacts, whilst complying with customer bulk water supply agreements.

The systems approach adopted by the organisation has enabled phased interventions (both short-term gains and long-term sustainability), monitoring and evaluation of interventions, and continuous identification of new energy saving opportunities.

The organisation's current interventions are:

- Load shifting to reduce maximum demand (KVA) and energy reduction(kWh),
- Power factor correction to reduce wasted or reactive energy (kVar)
- Correct tariff selection to align our operation to minimise electricity costs.
- Load reduction e.g. efficient equipment, occupancy sensors etc.
- Introduction of renewable energy sources e.g. solar power.

**Table 14** shows the energy saving interventions that were completed in 2009/2010.

**Table 14:** Energy Saving Interventions Completed in 2009/2010

Site	Intervention
1. Pineside Complex	Power factor correction
2. Pineside Complex	Solar heater and energy optimisation using a simple timer control for water heating within the ablution block
3. Pineside Complex	Room occupancy sensors to switch off lights when rooms are unoccupied, installed in all meeting room, canteens and toilets.
4. Durban Heights WW	Load shifting for the Pinetown pumps.
5. Durban Heights WW	Tariff reviewed.
6. Wiggins WW	Power factor correction installed.
7. Wiggins WW	Tariff reviewed and changed.
8. Hazelmere WW	Tariff reviewed and changed.
9. Ndwedwe Pump Station	Tariff reviewed and changed.

At this early stage, these interventions have not resulted in any significant improvement in efficiency. However, the system-wide energy reduction interventions that are planned **Table 15**, is likely to yield energy efficiencies.

Umgeni Water has engaged with other role players in the industry to ensure its energy management interventions are aligned with international trends as well as supported by national stakeholders, including Eskom.

**Table 15:** Future System-wide Energy Saving Interventions

Planned Interventions
1. Installation of solar water heating
2. Energy saving lamps replacement programme
3. Motor replacements with energy efficient type.
4. The use of variable speed drives to optimise consumption and improve pumping efficiencies.
5. Installation of occupancy sensors.
6. Optimise turbines (dam) to improve efficiency.
7. Solar panel assessment as part of energy mix.
8. Improve site energy monitoring (dashboard)

Umgeni Water also completed a feasibility study of co-generation at its Darvill Wastewater Treatment Works, notably to assess the methane capacity for sustainable production of electricity. The outcome of the feasibility study confirmed that the methane produced is sufficient for the works to generate up to thirty percent (30%) of its own electricity. Further analysis is planned.

# Environmental Sustainability

## Eco-efficiency

The organisation continues to monitor trends in energy, greenhouse gas and water treatment chemicals, amongst other resources, to track their usage efficiency over time. This trend information enables the organisation to assess the benefits of the interventions made to conserve and better use natural resources.

## Electricity Usage

In 2009/2010, 137.6 million kWh of electricity was used by the organisation for its operations (Figure 15). Usage was also less efficient in 2009/2010 by eight percent (8%) due to:

- An increase in pumping for the Mooi-Mgeni inter-basin transfer scheme to secure raw water resources to meet Mgeni system demands,
- Continuous pumping between systems (Wiggins high lift pump station to the Durban Heights system) to supplement demands, and

## Vehicle Emissions

The organisation monitors its vehicle fleet, in terms of fuel efficiency and as a contributor to air pollution from direct operations.

The number of fleet vehicles increased to 210 from 191 in the previous year (Figure 16). Fuel efficiency however improved slightly, by one percent (1%), over the previous year, attributable to ongoing conversion of the fleet with more fuel efficient vehicles.

## Greenhouse Gases

Umgeni Water contributes both directly and indirectly to carbon-dioxide (CO<sub>2</sub>) emissions. The direct emissions are related to fuel burning whilst indirect emissions are largely through electricity usage, the latter being the major driver of the organisation's greenhouse gas emissions.

Total carbon emissions for the year translated into 134,370 tonnes of CO<sub>2</sub>, of which 98.1% were attributed to electricity consumption. An increasing trend is observed (Figure 17), in line with the increase in electricity usage (Figure 15). The efficiency (i.e. emissions per cubic metre product) also worsened.

Umgeni Water's carbon footprint breakdown is shown in Figure 18.

## Chemicals Usage

The overall chemical usage for the financial year declined from 8,500 tonnes in 2009 to 8,200 tonnes in 2010 (Figure 19). In addition, chemicals usage was also more efficient by four percent (4%).

Improvements were made to the lime dosing system at Durban Heights Water Treatment Works which impacted positively on the chlorine utilisation at the works.

The improved efficiency was further due to optimisation of treatment processes.

## Waste Management

The organisation continued with its commitment to reduce, reuse and recycle its waste and all operational sites can identify and classify site waste. In the coming year, Umgeni Water will deepen waste separation and management, in support of the national goal of zero waste discharge.

Improvement in the management of wastewater treatment works sludge was achieved at Umgeni Water's sites as shown in Figure 20.

# Conserving our Natural Resources

Figure 15: Electricity Usage Trend

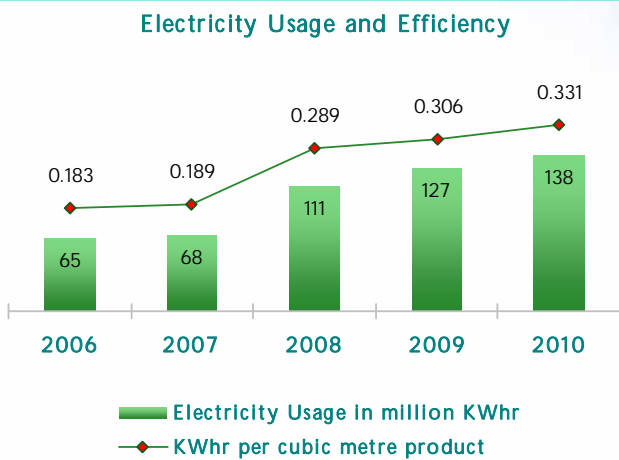


Figure 16: Vehicle Fuel Usage Trend

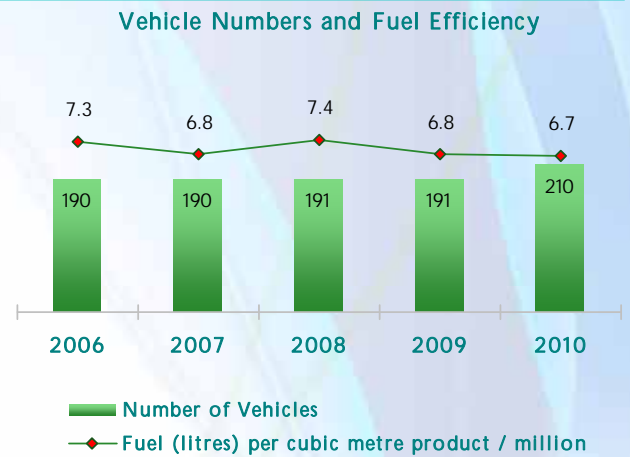


Figure 17: Greenhouse Gas Emissions Trend

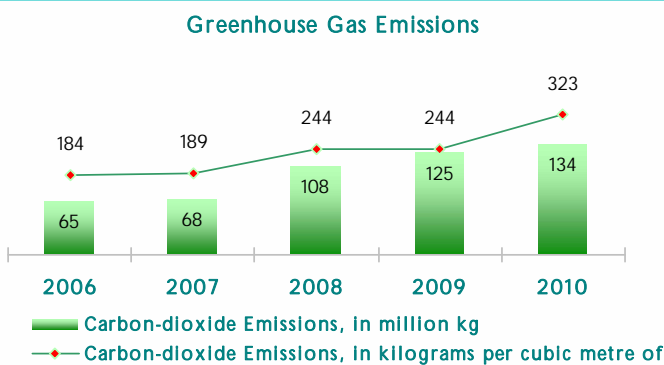


Figure 18: Contributions to Carbon Footprint

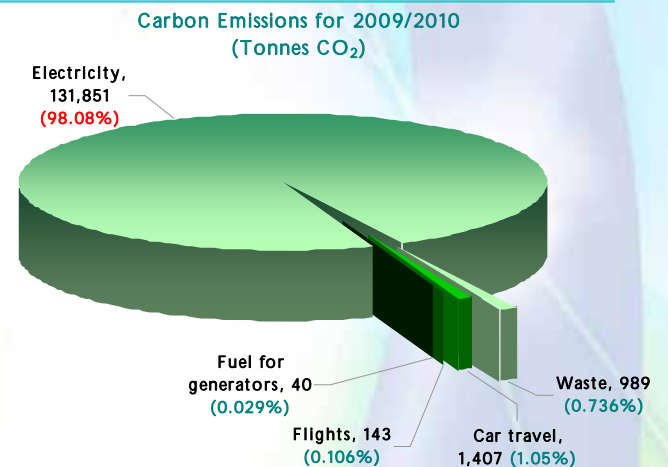


Figure 19: Chemicals Usage Trend

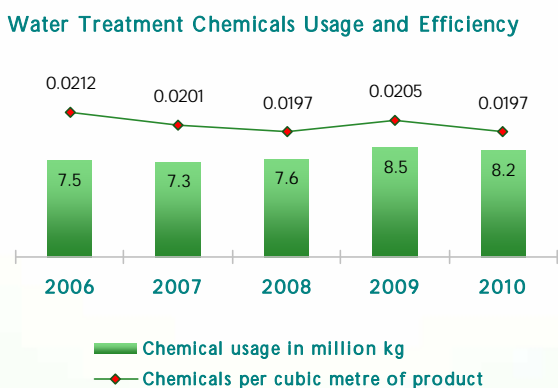
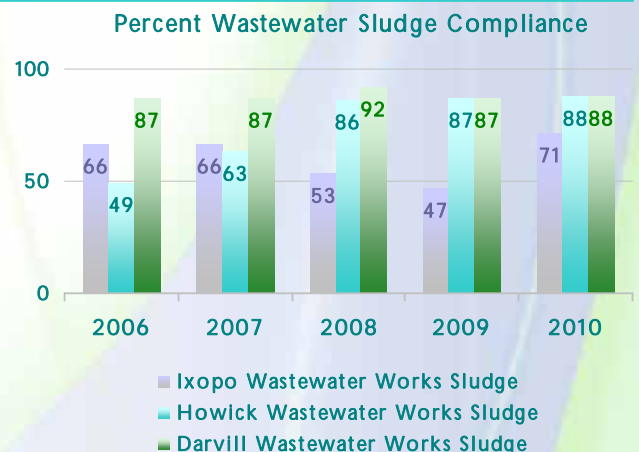


Figure 20: Wastewater Sludge Trend



## Environmental Impacts

Umgeni Water is committed to integrated environmental management (IEM) principles and ensures it undertakes environmentally sustainable planning, design, construction, operation, decommissioning and maintenance of its assets and activities.

This process follows a project life cycle approach (Figure 21) informed by the country's legislation and regulations.

Several authorisations for development were obtained by the organisation during the period under review. These include the Maphumulo Bulk Water Supply Scheme, South Coast Augmentation Booster Pump Station, Wartburg Pipeline as well as the Bulwer Dam, amongst others.

Where proposed developments are not listed activities, the organisation still undertakes environmental screening and develops the Environmental Management Plan. This together with Umgeni Water's Environmental Specification for Construction, ensures that the impacts on the environment can be mitigated at all times.

For all projects and phases, environmental performance is assessed and reported on a monthly basis. In 2009/2010, a total of 332 environmental assessments were undertaken in the areas of feasibility/design, construction and defects phase as well as at operational sites and water supply catchments. Results are shown in Figure 22.

Figure 21: IEM Process

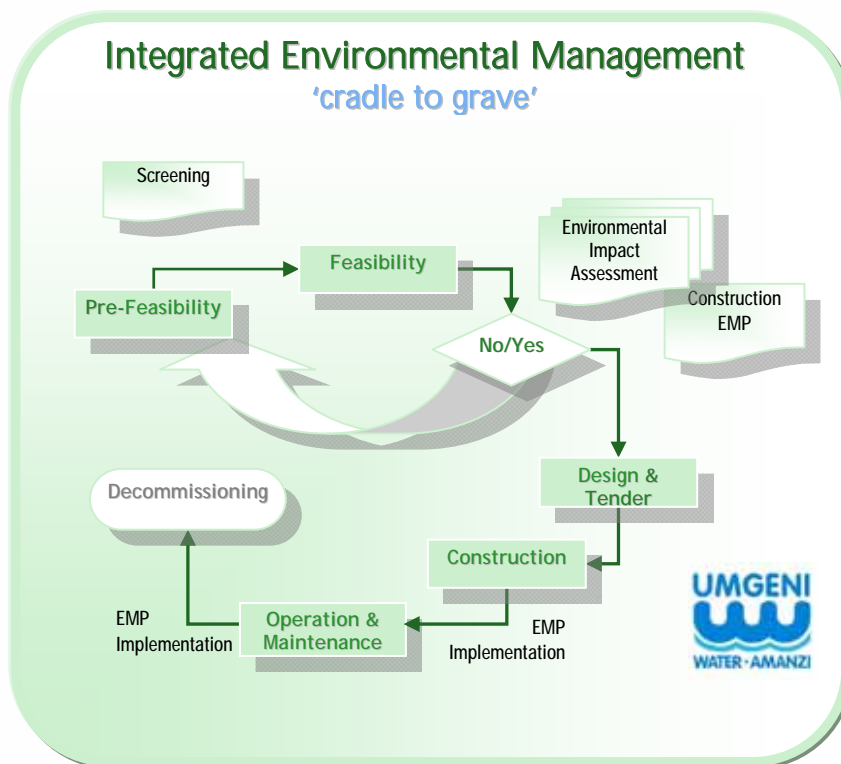
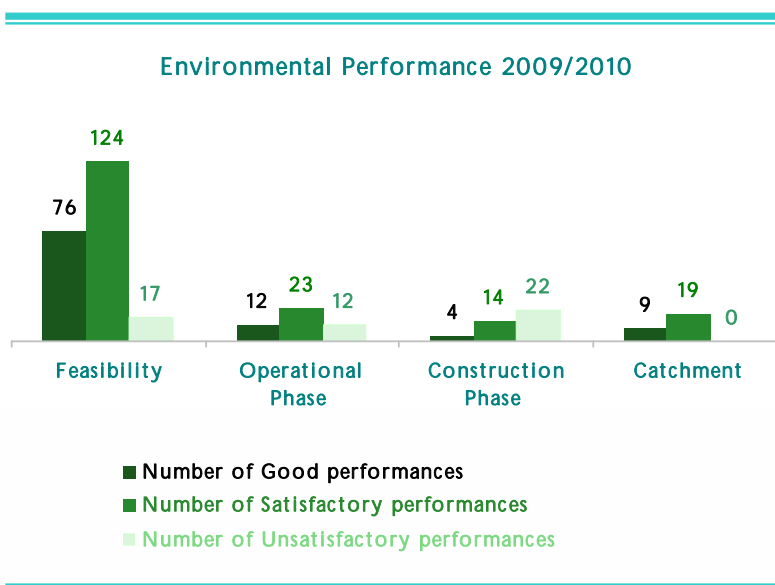


Figure 22: Environmental Impacts Identified though Audits in 2009/2010



Eighty-five percent (85%) of results were good or satisfactory. Unsatisfactory results, fifteen percent (15%), were attributable to, in each phase, the following:

## In Feasibility/Design Phase Projects:

- Delays in obtaining authorisation from the pertinent environmental regulator,
- Delays in projects due to environmental regulator not meeting the review period deadline, and
- Expiry of authorisations received, resulting in delays whilst reapplying/applying for extension.

## In Construction or Defects Phase Projects:

- Contractors not working within the allowed servitude,
- Contractors failing to put in place anti-erosion measures, notably when working in steep areas,
- Diesel and oil spillages during construction,
- Inadequate bedding material used for pipelines, and
- Trenches left open without demarcation for extended periods.

## In Operational Phase Projects:

- Potential contamination of water courses due to discharges of effluent which did not meet quality standards, and
- Discharge of water treatment residues in volumes that exceeded the capacity of sewer lines.

## Molweni Incident

An unavoidable raw water pipe-burst incident occurred in July 2009, which impacted on rural communities in the Molweni area.

Through working closely with a community task team, Umgeni Water was able to mitigate the impacts. Measures included provision of support and rehabilitation of damaged property.

Umgeni Water further adopted a school in the affected area, such that longer-term improvements could be made to the school, including upgrades, provision of seeds and development of food gardens, building learner awareness in water and environmental health, and providing career guidance, such that there could be longer term beneficial spin-offs for the wider community.

The incident further alerted the organisation to the potential risk faced by communities that encroach on pipeline servitudes in other areas of the catchment.

To enhance its control environment, Umgeni Water:

- Conducted aerial surveys and undertook thermal scanning of its pipelines in order to identify encroachment risk areas as well as potential leak risk areas, and
- Drafted a more resilient servitudes encroachment policy that will consider risk to the organisation and community, as well as provide options that would enable communities to participate in servitude management.

## Biodiversity

### DV Harris to World's View Pipeline Construction and Biodiversity Conservation.

Umgeni Water remained firm in its commitment to minimise any impact on the Kettlefontein grassland in the construction of the DV Harris to Worlds View pipeline.

A comprehensive report on this bulk water infrastructure development is presented in an earlier section of this report.

Of several potential routes investigated for the construction, the most feasible route was one that bordered on the northern edge of this Moist Midlands Mistbelt grassland which is classified as endangered.

Adding to the biodiversity value of this area is the presence of many species of bulbs and flowing plants the rarest being a red-data species, the Hilton Daisy (*Gerbera aurantiaca*).



## Environmental Sustainability continued

During construction, which began in March 2009 and completed in June 2010, Umgeni Water appointed a rehabilitation specialist, who in turn worked very closely with the South African National Biodiversity Institute and supervised the plant rescue programme. Approximately 5,000 bulbs including *Watsonia*, *Hypoxis* and *Ledebouria* species were collected, bagged and hot-housed over the construction period. These bulbs will be planted back out in spring, October 2010, when the rehabilitation of the construction servitude gets underway. Eight rosettes of Hilton Daisy (*Gerbera aurantiaca*) were directly transplanted to a site in the Kettlefontein grasslands away from the construction area.

Most of the plants successfully grew new leaves and several bloomed in the first season post-transplant. *Aloes*, *Boophone disticha* and *Scadoxys* species were also directly transplanted.

As a contribution toward the further conservation of the grassland, Umgeni Water commissioned the development of a Conservation Plan for the Kettlefontein Grassland. The plan called for the control of alien vegetation as a first step and Umgeni Water tasked the project rehabilitation specialist with the implementation of the initial alien vegetation clearing programme both on and off the construction servitude. Umgeni Water also facilitated a working group including the Msunduzi Local Municipality and Ezemvelo KZN Wildlife who are working together to improve the conservation status of the grassland.

The development of a strategy for biodiversity conservation for

Umgeni Water operational sites and pipeline servitudes has been initiated. The objective of the strategy is for Umgeni Water, as a significant land holder, to utilise this resource to contribute to furthering biodiversity in KwaZulu-Natal.

### Maphumulo Bulk Water Supply EIA

Work on the environmental impact assessment for the Maphumulo Bulk Water Supply Scheme has been completed and authorisation for the development obtained. The main environmental issues to be mitigated are the potential impact on the Hlimbithwa River and biodiversity related issues. Mitigated for which have been incorporated into the environmental management and rehabilitation plans.

### Mhlabatshane Bulk Water Supply EIA

Review and updating of the EIA for the Mhlabatshane Bulk Water Supply was completed and indicated no major environmental flaws. Potential impacts were identified that needed to be mitigated and include impacts on the river system during both the construction and the operational phase of the proposed Mhlabatshane dam.

Two small wetlands that will be inundated, during the dam construction will be mitigated by the dam development encouraging and supporting the development of a larger wetland at the dam inflow.

### Richmond Bulk Water Supply Pipeline EIA

The first round environmental impact assessment for the Richmond Bulk Water Supply pipeline were completed, which

enabled mitigation measures to be proactively identified.

Potential impacts include those associated with river and road crossing and drainage, noise, loss of crops, trees and habitats.

Stakeholders including, the municipalities, landowners, and farmer's associations, Telkom, Eskom and Spoornet, the state Departments responsible for Transport, the Department of Agriculture, Environmental Affairs and Rural Development, have been actively engaged in the development.

### Ozwothini Bulk Water Supply EIA

Work completed as part of the Ozwothini Bulk Water Supply development includes review of the feasibility study, completed in March 2010, and completion of the first round environmental assessment work which showed no fatal environmental flaws associated with the development.

An EIA is currently in progress. The Sikoto dam could enhance the ecological status of the Sikoto Valley, however its operation would need to provide for releases and spates to enable the Sikoto River below the dam to remain perennial and maintain its natural riverine ecology.

### Avondale to Honolulu Pipeline EIA

The construction of the Avondale to Honolulu Bulk Water Supply pipeline was preceded by an EIA. Stakeholder engagement continued during the development which had minimal or no disruption or impacts.