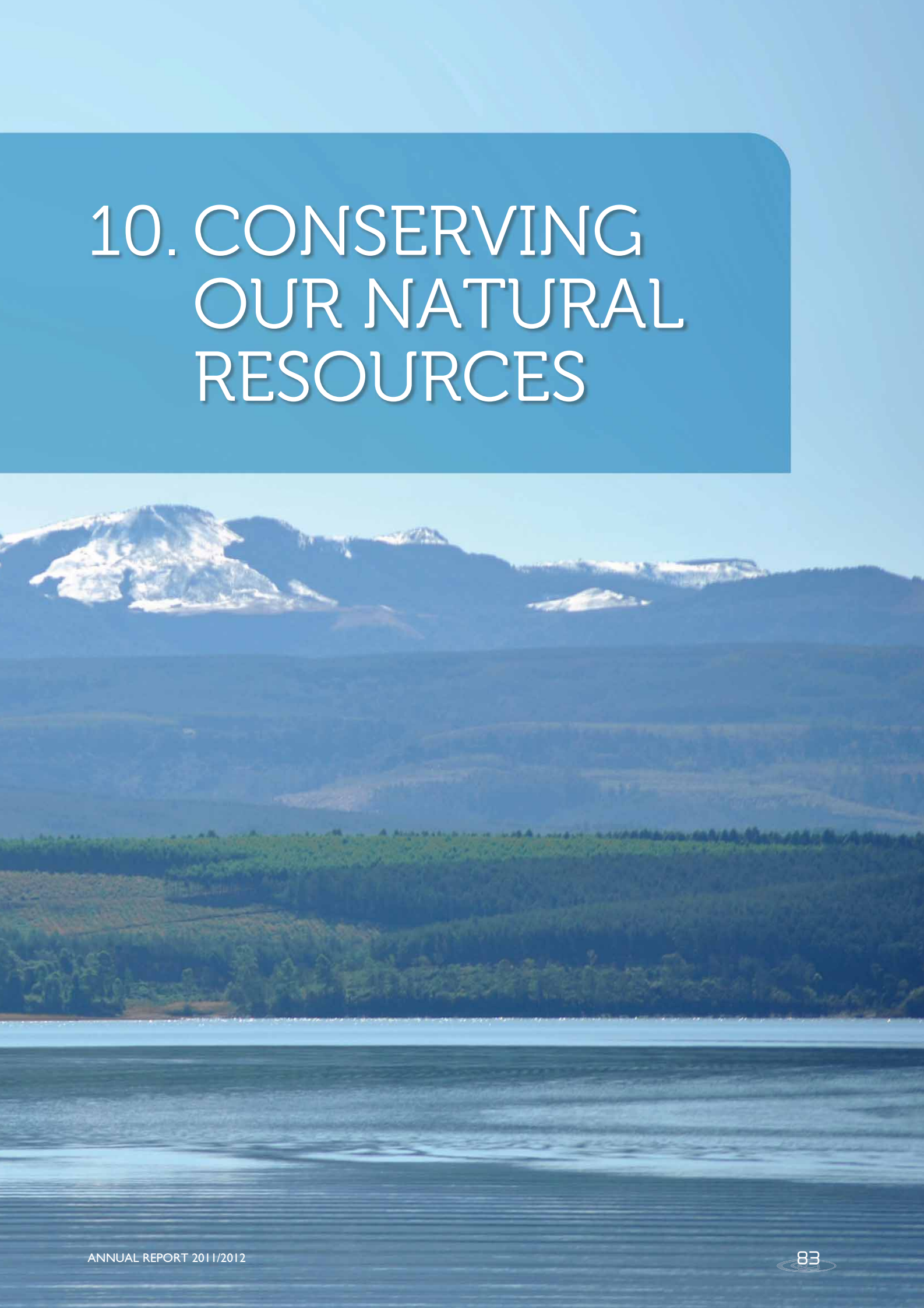
10. CONSERVING OUR NATURAL RESOURCES



10.1 ENVIRONMENTAL SUSTAINABILITY, INCLUDING WATER RESOURCES ADEQUACY

Management Approach

Umgeni Water strives for sustainable growth and will ensure the organisation continues to provide and extend sustainable water services to all areas. Mindful of its high reliance on adequate supplies of raw water resources, energy, chemicals and other natural resources to undertake its core business services, Umgeni Water is committed to protecting, conserving, efficiently using and sustaining these resources.

In addition to the mandatory disclosure requirements for a public water services entity in South Africa, Umgeni Water continues to improve alignment of its environmental indicators with the internationally accepted GRI - Global Reporting Initiative - indicator disclosure requirements, in terms of materiality and relevance. Aspects include: materials, including chemicals and water resources, energy efficiency, greenhouse gas emissions and carbon footprint mapping, biodiversity, and waste management, amongst others.

Water Resources Adequacy

The core function of Umgeni Water, the treatment and supply of bulk potable water, is highly dependent on the availability of sustainable water resources. Total water withdrawal by source is shown in Table 10.1.

A map of water resources quality and quantity in shown in Figure 10.2. Umgeni Water primarily sources water from ten impoundments on three major water resource systems namely, the Mgeni System (Mooi and Mgeni rivers), the North Coast System (Mdloti River) and the South Coast System (Nungwane, Mzimayi and Mzinto rivers).

Table 10.1: Total water withdrawal by source in 2011/2012

System	Site	Abstraction million m^3
Mooi-Mgeni	Midmar Dam Mearns Weir Albert Falls Dam Nagle Dam Inanda Dam *Re-use feasibility study in progress.*	451
North Coast	Hazelmere Dam Mvoti River Imvutshane Dam Lower Thukela	18
South Coast	Nungwane Dam EJ Smith Dam and Mzinto Dam Mtwalume River Well points Mhlabatshane Dam	8.1 2.5
Other	Ixopo Dam	0.83

In the year, progress was made with the following water resources developments:

- Spring Grove Dam (DWA-TCTA), which is in construction.
- Mkomazi Project (DWA), for which the detailed feasibility study is in progress.
- Imvutshane Dam, which is in tender for construction.
- Hazelmere Dam Raising (DWA), which is in detailed design.
- Mhlabatshane Dam, for which construction is complete.
- Wastewater Reuse, for which the feasibility study is in progress.
- Seawater Desalination, for which the detailed feasibility study, is underway.

During the year, resources were used assiduously and water balancing and water loss management measures were instituted in the treatment systems. The total water loss level has been maintained below the target of 5% with 2.26% achieved.

Water reuse is an important part of water resources planning given the scarcity of water resources, the costly nature of infrastructure to build new resources and the opportunity to reuse large quantities of water currently released back into the environment. As part of diversifying its water resources mix, Umgeni Water initiated the Umlaas Road New Water Project (URNWP). The project, which forms part of a two-year Water Research Commission (WRC) sponsored study, is considering treatment of 70 to 75Ml/day of wastewater from Umgeni Water's Darvill Wastewater Works (WWTW) to potable standards and reintroducing this into the existing distribution network at Umlaas Road.

Membrane Bioreactor (MBR) technology will be used in combination with advanced treatment processes capable of producing purified water of an extremely high quality. Treatment technologies being tested include Ozonation, Granular Activated Carbon, Nanofiltation, Reverse Osmosis and UV radiation. Environmental screening studies which will assess any potential impacts that could arise from implementation of the project will be undertaken as part of the study. The feasibility studies and research is due for completion in July 2013.

Climate change

Umgeni Water has continued with its important collaborative research work to assess climate change risk on its business. Work in the past year included the addition of simulations from additional climate models, that have become available, namely, newer versions of the University of Cape Town models plus those from the Council for Scientific and Industrial Research were acquired, and together with those from the Swedish Meteorological and Hydrological Institute, were used.

Thirty-one different future climate scenarios were used to assess the impact on the hydrology and water security of the four main supply dams in the Mgeni catchment. These scenarios comprise 14 different General Circulation Models from 12 different institutions throughout the world, with 5 different CO_2 emission scenarios. This assessment has resulted in a range of possible alternatives, each of which has been packaged into a Scenario Selection Tool.

This study is the first of its kind in South Africa and the rest of world, due, not only to being contemporary in terms of determining the impact of climate change on water security, but also due to the extensive number of climate models used and the coupling of several complex modelling techniques.

Biodiversity Management

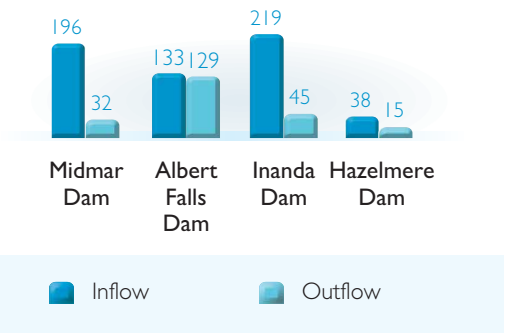
Research carried out over the past year indicated that Umgeni Water's infrastructure potentially impacts on three of the 39 areas afforded formal protection under the National Environmental Management Protected Areas Act and the South African National Biodiversity Institute (SANBI). The three nature reserves are the Midmar Nature Reserve, the Doreen Clark Nature Reserve and the

Queen Elizabeth Park Nature reserve which are all located in the uMgungundlovu District Municipality. Umgeni Water's infrastructure covers 0.32 % (28 km^2) of this municipal area and, of this, only 0.05% falls in or lies next to a protected area.

The Ezemvelo KwaZulu-Natal Wildlife also identifies critical biodiversity areas which, although are not all under formal protection, are nevertheless important for biodiversity conservation. The mapping indicating the areas where Umgeni Water's infrastructure crosses critical biodiversity areas has been completed for the uMgungundlovu and iLembe District municipalities. Further assessment is needed to identify the specific impacts, for which the Ezemvelo KwaZulu-Natal Wildlife database shows twelve red list species falling within the Extinct, Critically endangered, Endangered and Vulnerable categories to be present. A biodiversity strategy has been drafted to guide Umgeni Water's activities and initiatives to increase biodiversity and covers:

- Aquatic and land-based alien vegetation control programmes,
- Biodiversity Impact assessments and appropriate habitat rehabilitation during infrastructure planning and development,
- SASS monitoring of the riverine ecosystems at river abstraction and discharges sites, and
- Biodiversity management options for servitudes.

Figure 10.1: Environmental Releases from Dams (million m^3/a)



Umgeni Water abstracts most of its raw water from dams, which, by their very nature disrupt the natural river flow and ecology. To minimise this impact, provision has been made for the environmental reserve, which is a release of water from dams to maintain the downstream ecosystems. The volume releases are shown in Figure 10.1. As a proportion of inflow, the releases are 15% for Midmar Dam, 98% for Albert Falls Dam, 21% for Inanda Dam and 40% for Hazelmere Dam. The high outflow from Albert Falls Dam is due to releases to Nagle Dam for potable water abstraction and treatment at the Durban Heights Water Treatment Works.

The South African Scoring System 5 (SASS 5) rapid bio-assessment tool was used to assess the river health. Results of the assessments undertaken above and below dams are shown on the map in Figure 10.2. For Midmar Dam - insufficient water is being released, however, despite the low volume releases, the aquatic biota is diverse and the downstream health is maintained. At Albert Falls Dam, the river health downstream of the dam is lower than at the inflow, primarily due to the release of anoxic scour water from the dam, which did not spill during this financial cycle.

The status of raw water quality and problem per supply catchment is presented in Table 10.2. Potential water quality risks associated with Umgeni Water raw water supplies include: eutrophication (nutrient enrichment and its associated threats including algal blooms, taste and odour problems and aquatic weed infestation), faecal contamination and associated pathogen risks, suspended solids, and chemical constituents (including iron and manganese). This in turn has the potential to impact on treatability, chemical usage and associated treatment cost.

Table 10.2: Water Quality of Raw Water

System	Catchment	Impoundment	2009	2010	2011	2012
Mooi-Mgeni	Mooi-Mgeni	Mearns Weir, Midmar Dam	Good	Good	Good	Good
	Mgeni	Albert Falls Dam	Good	Good	Good	Good
		Nagle Dam	Moderate	Moderate	Moderate	Moderate
	Mgeni	Inanda Dam	Moderate	Moderate	Moderate	Moderate
North Coast	Mdloti	Hazelmere Dam	Moderate	Moderate	Moderate	Good
	Mvoti	Run-of-river abstractions				Moderate
		Boreholes				Good
South Coast	Nungwane, Lovu	Nungwane Dam	Moderate	Moderate	Moderate	Moderate
	Mzimayi	E J Smith Dam	Poor	Poor	Poor	Poor
	Mzinto	Mzinto Dam	Poor	Poor	Poor	Moderate
	Mtwalume	River Abstraction	Moderate	Moderate	Moderate	Moderate to Poor
Ixopo	Ixopo, Mkomazi	Ixopo Dam	Moderate	Moderate	Poor	Poor

Land and Sustainable Resource Management

Msinsi Holdings (Pty) Ltd, a wholly-owned subsidiary of Umgeni Water is mandated to manage the land and biodiversity of the areas around the dams owned or managed by Umgeni Water in a way that balanced the divergent factors of local community development, provision of recreational facilities for the public and water resources/biodiversity protection. These reserves are located at:

- Albert Falls Dam,
- Nagle Dam,
- Inanda Dam,
- Shongweni Dam, and
- Hazelmere Dam.

In the past year, Msinsi implemented its resource management plan, which focused on:

- The management of the game and species according to the carrying capacity of each reserve
- Local community development
- Recreation for the public
- Grassland management
- Control of pollution inside the purchase areas, and
- Removal of alien invasive plants, both terrestrial and aquatic.

Msinsi Holding continues to be seen as a significant player in the conservation and tourism sector in KZN. The close proximity of the Reserves managed by Msinsi Holdings to the urban centres of Durban and Pietermaritzburg make these little pockets of biodiversity all the more valuable. Msinsi Holdings will continue to ensure that the ecosystem services provided by the resources it manages on behalf of Umgeni Water are sustainably managed.

① Ixopo

- Abstraction Points Ixopo Dam. Ixopo Golf-course Borehole
- Abstraction 2.3 m^3/a
- Water is abstracted from the Solly-Bux dam and Ixopo Golf Course Borehole.
- Water Quality: Chemical and faecal contamination, due to sewer problems in Ixopo Town. Eutrophication and elevated organic carbon, algal blooms and aquatic weed problems. High iron and associated turbidity.

② North Coast System

- Abstraction Points and Yields (million m^3/a): Hazelmere Dam (19), Mvoti River (3.3), Imvutshane Dam (2.4), Lower Thukela (45)
- Abstraction: 18 million m^3/a.
- The Mgeni System comprises four dams on the Mgeni River, namely Midmar Dam, Albert Falls Dam, Nagle Dam and Inanda Dam. It is augmented by the Mooi Mgeni Transfer Scheme (Phase 1) which consists of the Mearns Weir on the Mooi River, the Mearns Pumping Station with a maximum transfer capacity of 3.2 cubic metres per second and a raw water transfer pipeline that discharges into the Mpofana Stream, which flows into the Lions River and then into the Mgeni River upstream of Midmar Dam. The system currently has a yield (at a 99 % level of assurance) of 334.5 million cubic metres per annum at Inanda Dam.
- Water Quality: Good water quality at the abstraction site, which is situated near the dam wall. Elevated turbidity with river abstractions, associated with high intensity rainfall/storm events. Generally good water quality from boreholes. Generally good water quality. Elevated iron and manganese in the raw water supply, associated with strong stratification of water column.

SASS 5 KEY Natural ≥ 7 | Good 6 - 6.9 | Fair 5 - 5.9 | Poor < 5

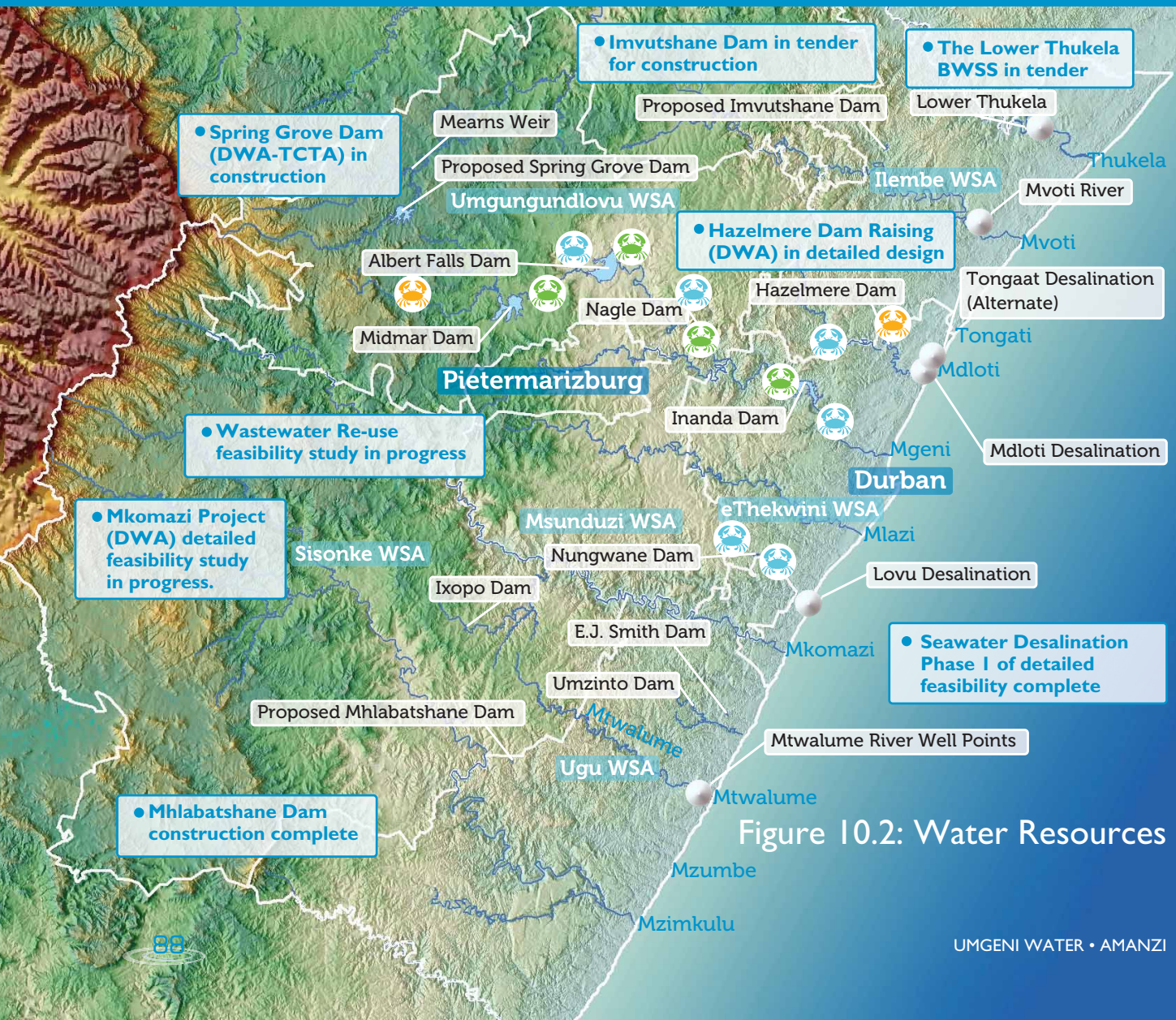


Figure 10.2: Water Resources

③ South Coast System

- Abstraction Points and Yields (million m^3/a): Nungwane Dam (3.3), EJ Smith Dam and Mzinto Dam (3.2), Mtwalume River Well points (1.2), Mhlabatshane Dam (1.5)
- Abstraction: 11million m^3/a.
- The South Coast System comprises a number of interlinked operational entities. Water resources for this area are obtained from the Nungwane Dam on the Nungwane River (a tributary to the Lovu River), the Mzinto and EJ Smith dams on the Mzinto and Mzimayi rivers respectively, and a sand abstraction system on the Mtwalume River. This system is substantially augmented by the Mgeni system via the South Coast Augmentation Pipeline and the South Coast Pipeline..
- Water Quality: High algal count and high organic carbon, associated with eutrophication (Mzinto Town sewer problems). Algal blooms frequently include those producing toxins, requiring activated carbon dosing. Elevated turbidity and faecal contamination. High iron and manganese concentrations and odour, which all have to be managed during the treatment process. Indication of increasing eutrophication. Some erosion runoff contamination. Faecal contamination. Increasing turbidity with rain related runoff.

④ Mooi-Mgeni System

- Abstraction Points: Midmar Dam, Mearns Weir, Albert Falls Dam, Nagle Dam, Inanda Dam
- Yield: 335 million m^3/a at Inanda.
- Abstraction: 452 million m^3/a.
- The Mgeni System comprises four dams on the Mgeni River, namely Midmar Dam, Albert Falls Dam, Nagle Dam and Inanda Dam. It is augmented by the Mooi Mgeni Transfer Scheme (Phase 1) which consists of the Mearns Weir on the Mooi River, the Mearns Pumping Station with a maximum transfer capacity of 3.2 cubic metres per second and a raw water transfer pipeline that discharges into the Mpofana Stream, which flows into the Lions River and then into the Mgeni River upstream of Midmar Dam. The system currently has a yield (at a 99 % level of assurance) of 334.5 million cubic metres per annum at Inanda Dam.
- Water Quality: Good water quality in Mgeni inflow. Excellent quality in Albert Falls dam, from where water is stored and released for abstraction in Nagle dam. Occasional algal blooms in Nagle dam due to eutrophication in intermediate catchment (feedlots). Good quality at the abstraction site, which is situated near the Inanda dam wall. Poor quality in upper reaches of the Dam, where there is high algal count from eutrophication and high organic carbon (arising from Msunduzi tributary, which drains Pietermaritzburg, and Darvill WWTW).

Imvutshane Dam in tender for construction

Communities in the largely rural areas inland of the North Coast region - areas bounded by the uThukela and Mvoti rivers and extending from Greytown in the west to Maphumulo in the east - currently receive water from boreholes or small stand-alone surface water supply schemes, many a sub-RDP standard level of service.

UW implemented the Ngcebo BWSS that draws water from the uThukela River to supply potable water to some of these communities. Furthermore, UW recently constructed Phase 1of the Maphumulo BWSS to supply the communities of Maphumulo, Maqumbi and Ashville. This scheme will initially draw water directly from the Imvutshane River, which is a tributary of the Hlimbitwa River, which in turn is a tributary of the Mvoti River.

Phase 2 of this scheme entails the construction of a dam on the Imvutshane River to replace the run-of-river abstraction system. This will increase the yield from the scheme and ensure a more sustainable supply. The detailed design of this dam has now been completed and construction is expected to commence in the latter part of 2012.

Spring Grove Dam (DWA-TCTA) in construction

The Trans-Caledon-Tunnel-Authority (TCTA) is implementing the construction of the Spring Grove Dam project as quickly as possible in order to augment the Mgeni system and reduce the risk of possible future restrictions. Construction of the dam was initiated in the first half of 2011 and it is expected that the construction will be completed in 2013, following which impoundment will commence. The transfer of the first available water is expected in April 2013

The Lower Thukela BWSS in tender

This is a cost-effective scheme to supply the area. This scheme will be required to augment the Mdloti System, as raising of Hazelmere Dam on its own will not be sufficient in the medium term. The Lower Thukela BWSS will draw water from the Thukela River and will not require impounding. UW is in the process of undertaking a detailed design of this scheme and construction will be undertaken in components, with the first construction tender in 2012.

Wastewater Re-use feasibility study in progress

The option of treating domestic sewage from the Darvill WWTW to potable standards is being investigated. The proposal is to return treated water into a target distribution point, to augment the supply to the high growth areas along the western corridor of eThekwini MM. A full feasibility study, together with an investigatiion on the impact on the yield of the Mgeni system and below are being undertaken, and is to be complete in 2014.

Mhlabatshane Dam construction complete

The Mhlabatshane BWSS is being constructed by UW as part of a larger regional scheme by Ugu DM aimed at reducing water services backlogs in certain rural areas in the Mzumbe and Hibiscus Coast. The bulk component of the scheme includes construction of a dam on the Mhlabatshane River (a tributary of the Mzumbe River). The Mhlabatshane Dam has recently been commissioned and will take approximately one year to impound sufficient water for use by the scheme.

Mkomazi Project (DWA) detailed feasibility study in progress

The planning of Mkomazi Water Project, to support the Mgeni system is in progress to ensure future water demands can be met timeously and at the appropriate level of assurance. DWA has initiated a detailed feasibility level investigation and Umgeni Water has undertaken to complete concurrent detailed feasibility level investigations into the bulk potable water component.

Hazelmere Dam Raising (DWA) in detailed design

DWA strategies for augmenting the North Coast water supplies, include, Raising Hazelmere Dam, and Implementing the Lower Thukela Bulk BWSS. The detailed design and geotechnical investigations are currently in progress (DWA) for Hazelmere Dam, who will consider this, vis-à-vis, the Lower Thukela BWSS.

Seawater Desalination phase 1 of detailed feasibility complete

UW completed phase 1 of a detailed feasibility study for large-scale desalination plants for both the North Coast and South Coast regions of its supply area. The sizing of these plants is aligned to bulk water supply infrastructure plans for these areas, which will be utilised to convey potable water from the desalination plants to the various distribution points. The eThekwini MM, Ugu DM and iLembe DM will be the beneficiaries of this project, for which the full detailed feasibility study will be completed in 2013.

Alien Plant Management and Job Creation

Umgeni Water continued to implement the Working-for-Water programme as an implementing agent to the Department of Water Affairs, for the Mvoti to Mzimkhulu Water Management Area (WMA). In 2011/2012 Alien plant clearing was undertaken in several catchment areas, including:

Mgeni Valley: Approximately 105 ha were cleared (initial clearings) and approximately 450 ha were cleared as follow-up clearings. Typical weeds cleared, mainly *Lantana camara* (lantana) with some *Solanum mauritanium* (bugweed), *Eucalyptus sp* (gumtree), *Acacia mearnsii* (black wattle) as well as *Rubus cuneifolius* (bramble). A total of 154 people were employed (136 males, 18 females, 0 disabled people).

Upper Mvoti Area: Approximately 308 ha were cleared (initial clearings). There were no follow up clearings as this is a new project. Typical weeds cleared, mainly *Lantana camara* (lantana) with some *Solanum mauritanium* (bugweed), *Eucalyptus sp* (gumtree), *Acacia mearnsii* (black wattle) as well as *Rubus cuneifolius* (bramble), *Melia azedarack* (syringa). A total of 94 people were employed (27 males, 67 females, 0 disabled people).

Nagle Area: Approximately 87 ha were cleared (initial clearings) and approximately 429 ha were follow up clearings. Typical weeds cleared, predominantly *Lantana camara* (lantana) and *Chromoleana odorata* (triffid weed) with some *Solanum mauritanium* (bugweed), *Eucalyptus sp* (gumtree), *Acacia mearnsii* (black wattle), as well as *Rubus cuneifolius* (bramble), *Melia azedarack* (syringa), *Ricinus communis* (castor oil plant), *Caesalpinia sp* (Mauritius thorn), *Cassia sp* (peanut butter plant). A total of 203 people were employed (87 males, 116 females, 0 disabled people).

Materials Usage and Efficiency

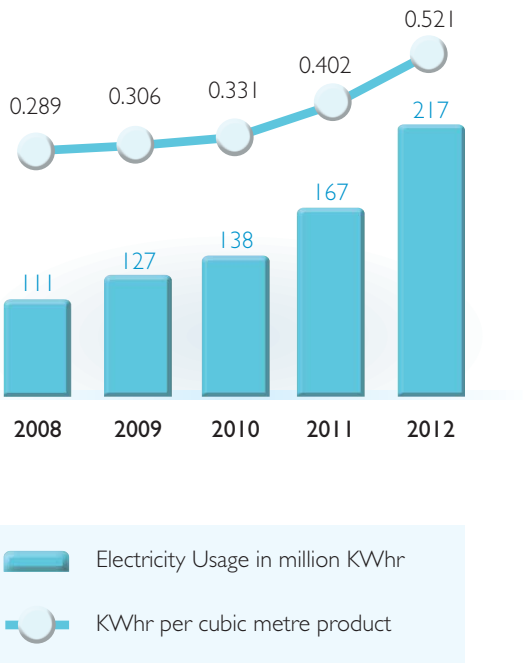
Water is one of the most significant input materials for Umgeni Water and is covered extensively in a later section of this chapter, followed by energy which is discussed below. In addition, Umgeni Water has a high reliance on water treatment chemicals resources and is therefore committed to improving the usage efficiency thereof. The current initiatives in place to maintain or improve treatment efficiency include:

- Water treatment process audits, which identify areas to improve operational efficiency,
- Monitoring and seasonally reviewing the quality of the water column/level in dams, such that raw water abstracted is optimal for treatment, and
- Participating in catchment management activities and forums, and contributing to the information base, including water quality, that helps shape and influence decisions for sustainable catchment land use activities and developments.

Energy Usage and Efficiency

Energy is a key input to water and wastewater treatment processes, and in 2011/2012 Umgeni Water utilised a total of 217 million kWh of electricity. Figure 10.3 shows energy usage and efficiency. The significant increase over the previous year (2010/2011: 167 million kWh), can be attributed to the increased pumping associated with demand for potable water. In addition, prolonged pumping of raw water through the inter-basin transfer scheme from the Mearns Weir in the Mooi River catchment into Midmar Dam was needed, in order to assure water supply to customers.

Figure 10.3: Electricity Usage and Efficiency Trends



This increasing trend in energy usage together with reduced energy efficiency has led to more intense auditing in 2011/2012 to better establish the energy baseline. The energy audit coverage included ten water treatment works, three wastewater treatment works and two regional office buildings. The data gathered is being analysed and will enable closer scrutiny of energy usage of unit processes and where the organisation has opportunity to implement energy efficiency initiatives. The current energy initiatives have continued and include:

- Energy efficient lighting measures,
- Replacement of pump motors with more energy efficient motors,
- Progressive replacement of the organisation's fleet with more fuel efficient vehicles,
- Installation of solar water geysers, and
- Hydroelectric feasibility study at Mearns Weir.

Emissions and Reduction Initiatives

Umgeni Water's direct CO_2 emissions arise from fuel usage for transport (vehicles), general waste and from generators and boats, while indirect CO_2 emissions are primarily due to electricity usage and to a minor extent flights.

The organisation's carbon footprint is primarily due to electricity consumption, and has accordingly been increasing over the years (Figure 10.4).

Current initiatives to reduce the organisation's carbon footprint include development of an electricity co-generation plant at the Darvill Wastewater Treatment Works. The energy generation system will comprise a biogas pre-treatment unit and two generators. The plant will utilise the methane gas generated in the bio-digesters to produce electricity. Preliminary studies indicated that approximately 40% of the total energy requirement of the wastewater treatment works can be generated from this source.

Other initiatives include:

- Tree planting initiatives (5 trees per site),
- The Darvill wastewater works forestation project (100 trees will be planted),
- Donation of 400 trees to schools,
- Indigenous forest planting for community outreach (55), and
- A more comprehensive carbon footprint study for the organisation.

Figure 10.4: CO_2 Equivalents (tonnes)

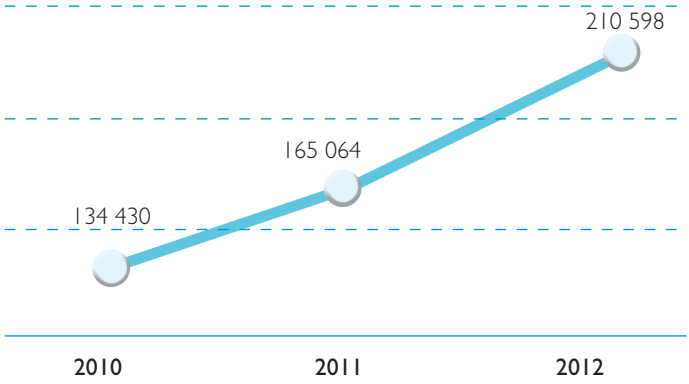


Table 10.3: CO_2 Equivalents (tonnes)

	2010	2011	2012
Electricity	131,851	163,392	208,071
Travel: Car	1,407	1,334	2,086
Travel: Air	143	143	81
Waste	989	299	262
Other fuel	40	40	98
Total	134,430	165,064	210,598

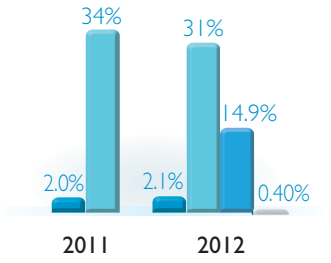
Table 10.4: Emissions of ozone depleting substances 2011/2012

	Vehicle Emissions (kg)	Emissions (kg)/kl product/million
Non Methane	1,119	2.7
Hydrocarbons		
Carbon Monoxide	15,806	38.1
Oxides of Nitrogen	2,697	6.5
Particulate Matter	252	0.6

Using the Albuquerque Vehicle Pollution Calculator (http://www.cabq.gov/airquality/vehiclepollution.html)

Figure 10.5: Waste Produced

Figure 10.6: Percentage Waste Recycled per site



Umgeni Water's core business of water and wastewater treatment does not produce significant amounts of ozone depleting substances, Chlorofluorocarbons (CFCs) or Hydro-chlorofluorocarbons (HCFCs).

Emissions were however monitored for 207 vehicles that the organisation has in its fleet (Table10.4). Emissions will progressively reduce, as old vehicles are replaced with the newer more fuel efficient vehicles.

Waste Management

In the past year Umgeni Water assessed quantities of waste generated, stored, treated, re-used, recycled, recovered and disposed of.

In respect of water and wastewater treatment residues:

- There is reasonably accurate quantification at one WTW site (Midmar),
- At two WTW sites, discharges of thin sludge are made directly to sewer,
- At 7 sites, thin sludge is discharged to river. Monitoring of impact of discharge to river is made for the material discharge site,
- The volume of wet sludge oils disposed as hazardous waste is quantified at three wastewater treatment sites, and
- At one site (Darvill WWTW) the thin sludge is sprayed onto adjacent instant lawn farming lands, whilst at two sites (Howick and Ixopo WWTW) the dried sludge residues are taken to a landfill site.

In addition to treatment works residues, Umgeni Water, recycles a limited amount (1.7%) of waste: including paper, metals and printer cartridges, amongst other items. Figure 10.6 shows percentage waste recycled at sites. The head-office complex introduced the War on Waste (WOW) campaign in 2011, to improve the amount of waste recycled. A small BBBEE contractor undertakes this recycling.

Environmental Management

In 2011/2012 Umgeni Water audited 40 operational sites to assess environmental compliance and management. Figure 10.7 shows minor and major incidents. Implementation of the recommendations enabled mitigation measures to be put in place to reduce environmental impacts and minimise similar incidences in the future.

Incident management systems are in place to ensure that pollution is properly responded to. A number of incidents did occur, but were minimised and mitigation undertaken. Monitoring was conducted to assess possible impacts, and where relevant, responsible authorities were kept informed. Problems have included issues such as release of methane from digesters without flaring, spillage of untreated sewage from storm dams and pump stations, and release of water treatment residues (sometimes chlorinated) from water treatment works to streams.

On average, 1% of total project capital infrastructure budget is allocated to environmental management. All capital infrastructure projects in construction phase were audited by independent Environmental Control Officers (ECOs). In addition, weekly auditing was undertaken against the project specific Environmental Management Plans (EMPs) and authorisation requirements. In most cases contractors were significantly compliant with the EMPs. The small percentage of non-compliant areas included: Improper storage and disposal of rubble and waste material; mixing of concrete on exposed ground; instances of poor housekeeping; poor stormwater management and poor erosion control measures around construction site; failure to demarcate and protect excavation; mixing of topsoil and subsoil; poor management of diesel and oil spills; and lack of proper alien plant control. Recommendations were made by ECOs to contractors

and continuous monitoring undertaken to ensure improved environmental management at the construction sites.

Findings and recommendations for mitigation were reported to the contractors for implementation, with routine reports sent to the environmental authority.
No fines were imposed on contractors in the past financial year as contractors generally met the requirements of the site specific EMPs and Record of Decision (ROD) requirements.

Environmental impacts due to the transporting of products as well as other goods and materials used in bulk water operations were monitored on a monthly basis. A total of seven incidences, ranging from minor to medium were found (Table 10.5), for which mitigation measures were put in place. There were no major incidents.

Figure 10.7: Environmental Incidents

Table 10.5: Environmental incidences associate with transportation.

Incident	Major	Medium	Minor
Oil spillages from compressors			✓
Minor sludge spillages			✓
An ammonia spillage from a tanker during offloading			✓
A leaking reservoir resulting in soil erosion			✓
Discharge of large amounts of water into the Aller River		✓	
A sodium hypochlorite leak from pre-delivery line		✓	
Flooding of a digester pumpstation due to failure of an old bio-filter valve			✓

During the year, Umgeni Water provided water quality information and assistance to municipalities and other stakeholders regarding catchment pollution incidents that could potentially impact raw water resources. These included pollution incidents at Ixopo, where severe sewer problems were identified and impacted on the quality of raw water supplies for water treatment. In the Pietermaritzburg area, weekly river monitoring data were provided to the Msunduzi Municipality and other interested parties. At Mzinto, similar response was made to pollution problems detected in the inflow to EJ Smith dam. Umgeni Water has also been a participant in several HAZMAT incidents and industry discharges, where spillages have threatened raw water resources. Recommendations for improving response systems were made.

Inspection of Critical Assets Durban Heights