GREENING
our supply chain

A guide to Environmental Sustainability for suppliers and contractors to Garden Cities NPC (RF)

Water

GARDEN CITIES
building green communities

Contents

Water

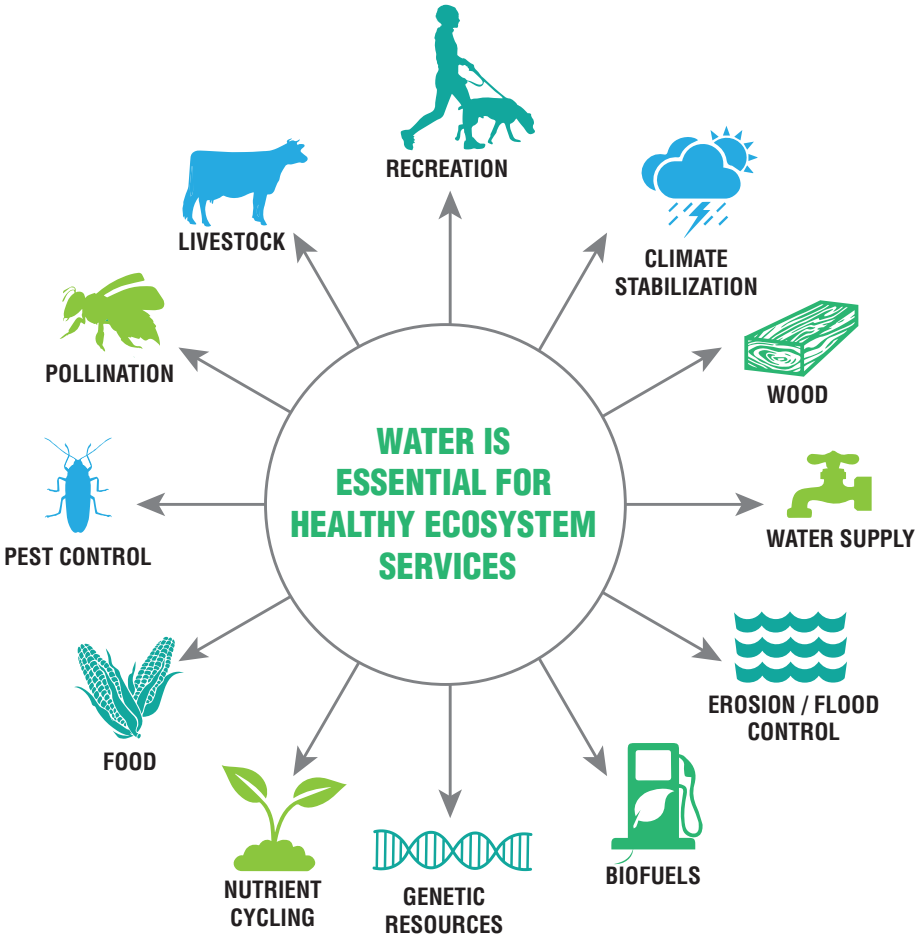
1. Committing to be water sensitive

Sustainable water resources management is a priority for Garden Cities NPC (RF). We support building processes that save water and promote natural water cycling and recycling. To help us build sustainably, we encourage our suppliers and contractors to help us build sustainably, we encourage our suppliers and contractors to be water sensitive.

2. Water and our environment

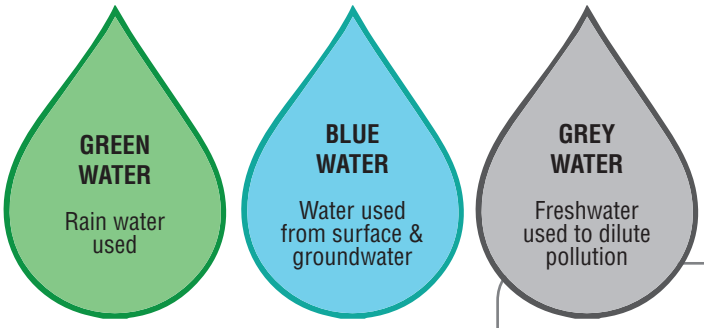
2.1 Water is life

Water is the essential ingredient for life, playing a unique role in direct or indirect provision of most ecosystem services. It does not fit well within boundaries and is essentially a cross-cutting entity spanning many scales in space and time. Some call water the bloodstream of the biosphere. Protecting our river systems, allocating fresh water efficiently and using water sparingly are the key elements to ensure a sustainable water supply.



2.2 Water footprint

Awareness of our water use patterns is an important part of managing water resources. The water footprint measures the amount of water used to produce each of the goods and services we use. It can be measured for a single process, such as growing wheat, for a product such as a pair of jeans, for the fuel we put in our car, or the operations of an entire company. It can also show us how much water is being consumed by country or globally in a specific river catchment. A water footprint also accounts for the amount of water contaminated during manufacturing and production because that water is made unusable and is, essentially, taken out of the system



The water footprint is a measure of our use of fresh water in volumes of water consumed and/or polluted.

The water footprint has three components: green, blue and grey. Together, these components provide a comprehensive picture of water use by delineating the source of water consumed, either as rainfall and soil moisture, surface and groundwater, and the volume of fresh water required for absorption of pollutants.

The water footprint allows us to answer a broad range of questions, for example:

Where is the water dependence in my business' operations or supply chain?

How well are regulations protecting our water resources?

How secure are our food or energy supplies?

What can I do to reduce my water footprint?

Single cup of coffee = **140** litres

One slice of bread = **40** litres

A steak dinner = **15,500** litres

A single egg = **200** litres

Pair of leather shoes = **8,000** litres

A new car = **400,000** litres

3. Sustainable water resources management

By the year 2030, experts predict that global demand for water will outstrip supply by 40 percent. Impacts from climate change are likely to cause changes to the water cycle, leading to prolonged periods of drought and more extreme rainfall. It is clear that we are facing serious water shortages and all sectors need to work together to find solutions.

What is collaborative governance?

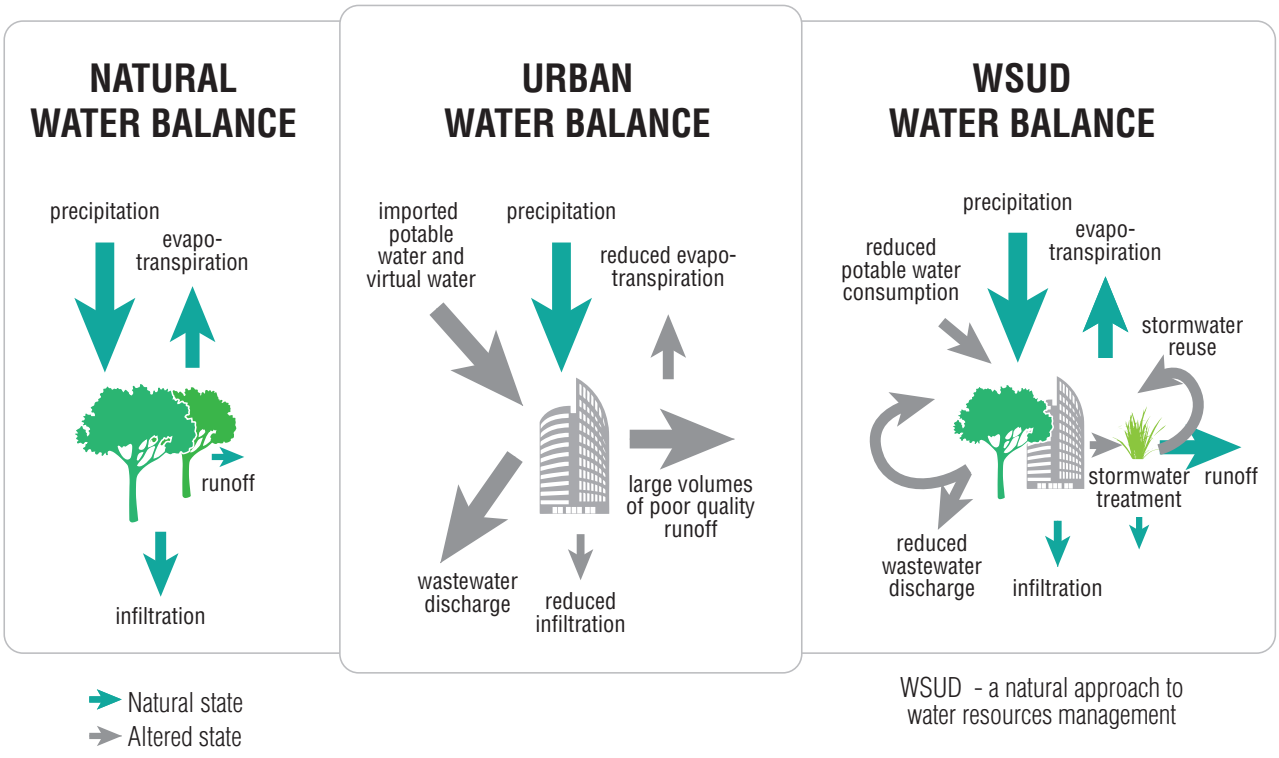
Collaborative governance involves the government, community and private sectors communicating with each other and working together to achieve more than any one sector could achieve on its own.

3.1 Water sensitive urban design

Water Sensitive Urban Design

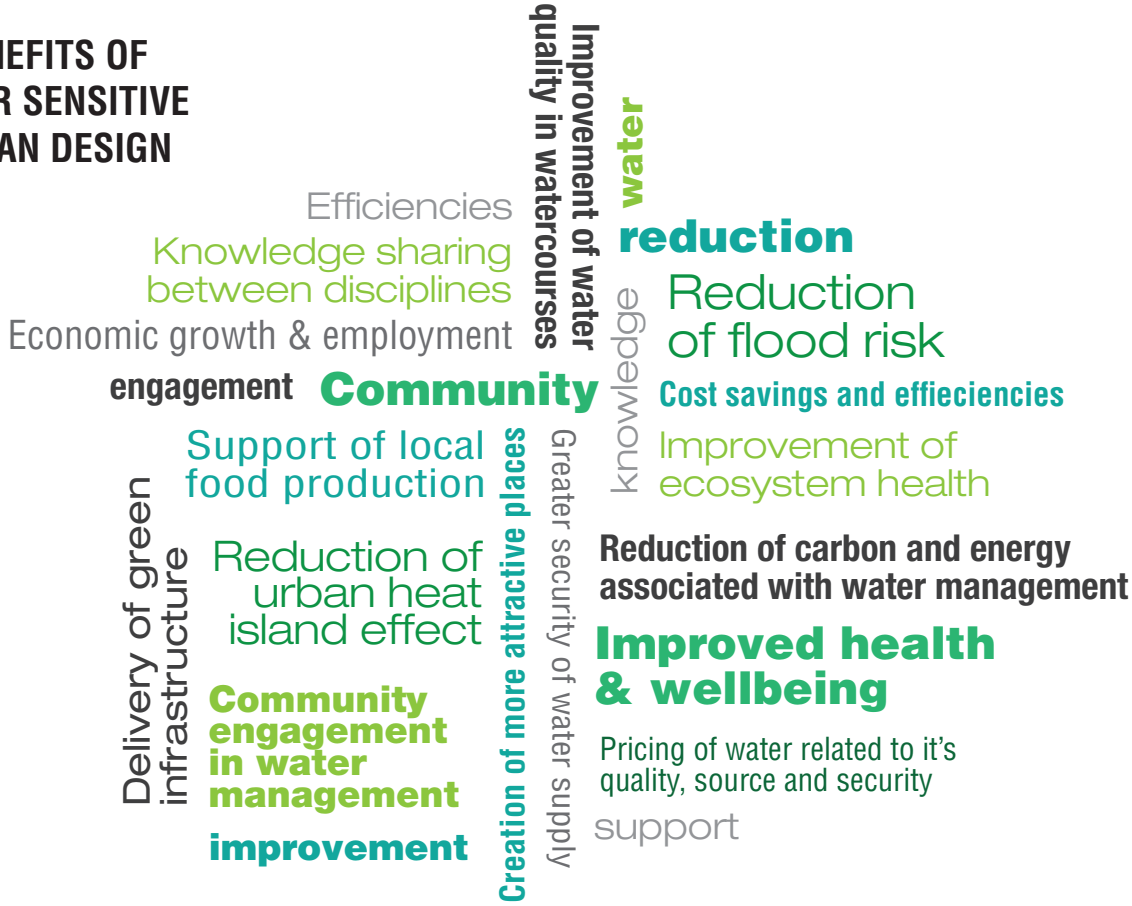
WSUD is a planning approach which integrates the urban water cycle (e.g. water supply, stormwater, groundwater and wastewater management) into urban design to improve ecological and social conditions.

Conventional urban stormwater management focuses largely on quantity (flow) management, by collecting runoff and channelling it to the closest watercourse. This has led to the erosion of natural channels and pollution, resulting in environmental degradation. Water Sensitive Urban Design (WSUD) is a new paradigm that offers an integrated approach to managing urban water resources in South Africa with the potential to address both social and ecological restoration. In particular, WSUD could transform the extremely divided settlements that are so typical of the country into ones where water can be used to connect disparate communities and bring about significant change. WSUD creates attractive, functional and valued places that are also sensitive to the needs of the water cycle. It overcomes challenges around water resources, localised flooding; the capacity of water supply, wastewater networks and water quality.



WSUD - a natural approach to water resources management

BENEFITS OF WATER SENSITIVE URBAN DESIGN



4. Water in South Africa

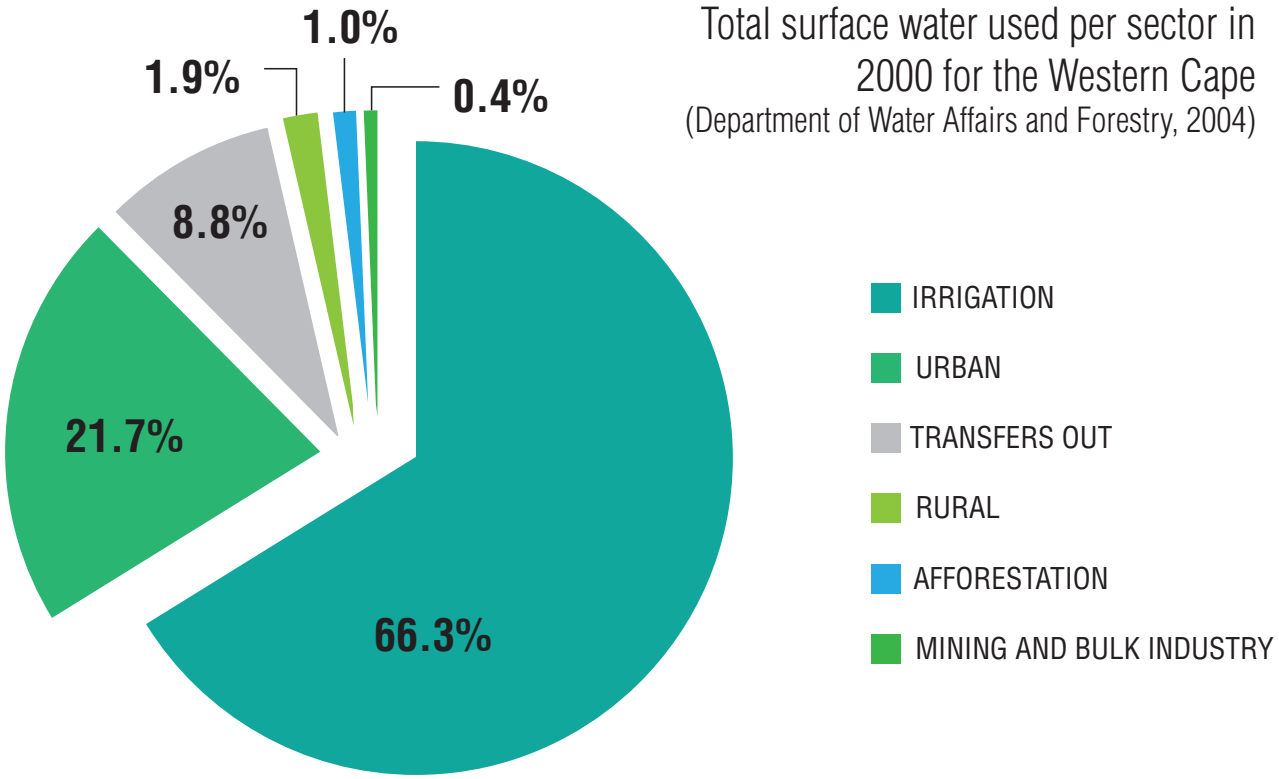
4.1 Water scarcity

With average annual rainfall around half the world average, South Africa ranks as the 30th driest country in the world. This makes us a water scarce country most exposed to water supply risks. Low average rainfall, however, is not South Africa's biggest water challenge, rather it is improving how our existing water resources are managed and used. Around 50% of South Africa's water is produced from 8% of the land, which makes distributing water across the country a great challenge. In the past, to overcome this, South Africa has relied heavily on feats of engineering, building huge dams and complex water transfer schemes to distribute fresh water uninterrupted to all its regions.

4.2 Water demand

In more than half of the country, South Africans are using more water than what's available. We are already using 98% of our available water supply and 40% of our wastewater treatment is in a "critical state". Demand for water has already overtaken supply in 60% of South Africa's water management systems. The bulk of the water usage in South Africa is used for agricultural and irrigation purposes as illustrated in the figure below.

At least **37%** of our clean, drinkable water is being lost through leaking pipes and dripping taps.



4.3 Opportunities and focus areas

A number of opportunities and focus areas exist to support the water value chain.

What is a riparian zone?

A riparian zone is the interface between land and a river or stream. Plant habitats and communities along the river margins and banks are called riparian vegetation.

Clearing invasive alien vegetation

Invasive alien plants pose a direct threat to South Africa's water security. They cover up to 10% of the country, and their distribution is increasing. In the Western Cape over 170 000 hectares of land is covered by invasive alien plants, predominantly in riparian zones. The Breede-Gouritz catchment is the most severely affected, with approximately 7% of water being used by alien invasive species. A number of organisations focus on clearing invasive plants, the most well-known of which is Working for Water, an initiative launched in 1995 by the Departments of Water Affairs and Forestry, Environmental Affairs, and Tourism and Agriculture.

Working for Water (WFW)

With 300 projects throughout the country, the WFW programme aims to enhance water security, improve ecological integrity, restore the productive potential of land and promote sustainable use of natural resources and invest in the most marginalized sectors of South African society.

Rainwater harvesting

Rainwater harvesting involves the small-scale collection, capture and storage of rainwater runoff for various productive purposes, including irrigation, drinking and domestic use to meet rising water demand. Harvested rainwater can be used for irrigation and household use, and can replace around 30% of domestic consumption. With a properly designed system, it can also be used as potable water. The UCT Climate Systems Analysis Group, together with the Water Research Commission (WRC), have recently developed an online tool for planning and decision-making for rainwater harvesting systems for many different roof types. This tool looks at location-specific climate conditions, types of installations and potential.

Groundwater recharge

Groundwater recharge is an important natural part of the water cycle, which occurs when water from the surface works its way into subsurface aquifers, replenishing groundwater supplies. Groundwater can be a useful supply of water (i.e. extracted through boreholes) but only sustainable if the recharge is sufficient. Artificial groundwater recharge has seen increasing amounts of research in recent years although it is not new. Initially prompted by the need to find an alternative to wastewater discharge into the marine environment, Atlantis began recharging its stormwater and treated wastewater into its sandy soils in 1979, through seepage ponds.

What is abstraction?

Abstraction is the removal of water, permanently or temporarily, from rivers, lakes, canals, and reservoirs or from underground rocks called aquifers. This can affect the water quality and quantity essential for healthy ecosystems.

Desalination

Recent indications are that by 2030, up to 10% of the country's urban water supply could come from water desalination plants. However, the desalination process has a high energy demand and South Africa is currently experiencing an electricity crisis together with targets to reduce carbon emissions. Globally, interest in desalination is resurging, particulalrly as a means of recovering wastewater. Large- scale desalination plants have already been constructed in Mossel Bay and Lamberts Bay, while planning for the City of Cape Town and Saldanha Bay is in progress. Although not a typical green technology water solution, desalination is considered because of its potential to work alongside renewable energy opportunities, as well as being at the forefront of membrane technology and alternative supply application.

Water sensitive cities

Green infrastructure is becoming increasingly recognised as an important opportunity for addressing the complex challenges of water management. Green infrastructure refers to the natural or semi-natural systems that provide services for water resource management, with equivalent or similar benefits to conventional (built) greywater infrastructure. These include permeable paving, green roofs,and bioretention ponds.

Bioretention ponds are cells or swales that remove contaminants and sedimentation runoff before it enters a watercourse. Stormwater is collected into the treatment area, which consists of a grass buffer strip, sand bed, ponding area, organic layer or mulch layer, planting soil, and plants.

Water reclamation

Water reclamation and recycling takes on many types, forms and definitions. The City of Cape Town is fast becoming active in the resource recovery market, with its wastewater department having received environmental authorisation for the development of a biosolids beneficiation facility. At present, the treated effluent from key plants is recovered for irrigation/ industrial/ golf estate use, and the majority of the sludge (biosolids) is applied to agricultural land. While the application of sludge onto farmlands has been ongoing for the past 12 years, the intention of the city going forward is to beneficiate the biosolids and recover energy and resources (e.g. nitrates for fertiliser, potable water) from these biosolids. South Africa's first direct potable reuse plant in Beaufort West was built during an emergency drought. Treated wastewater effluent is conveyed directly to a water treatment facility for further treatment to drinking water standard. Built in 2010 using reverse osmosis, ultrafiltration, ultraviolet, sand and chemical treatment technologies, the plant is still operational.

Smart metering in water

Over the last five years, there has been a substantial increase in information and communication technology (ICT) systems usage in the South African water sector. Broadly, the applications envisaged or currently implemented in development can be categorised into the following areas: customer management, operational management, and financial and control management. In all of these areas, ICT applications are used to collect information, streamline information flow and improve work processes. The water meter industry has seen substantial developments in the last two decades, with many new capabilities added to water meters. These advanced water meters (also called intelligent meters or smart meters) have additional functionality, such as the ability to communicate with the municipality or user, monitor consumption patterns, dispense prepaid water or sound a leakage alarm.

Shared risk and water stewardship

The concept of water stewardship has gathered traction as businesses have recognised the risk that water may have on their profitability and long-term viability. Water is a shared resource that requires businesses to look beyond their 'factory fences' and collaborate with a variety of different stakeholders to secure their water resources. The types of water risks that businesses typically face include:

- Physical risk: water quantity and quality issues that impact on production;
- Regulatory risk: the enforcement of regulatory powers that may result in changes in water pricing, supply, rights, standards and licence to operate;
- Reputation risk: the impacts on the company brand from public perceptions of water resource and pollution management.

As the water risks within South Africa become more pronounced and water resources more constrained, now is an ideal time for businesses to evaluate their own water risks to assess the relevance of water stewardship to their business sustainability.

Key organisations to work with include:

- WWF e.g. Water Risk Filter
- National Business Initiative (NBI)
- International Water Stewardship Programme
- Alliance for Water Stewardship
- United Nations Global Compact.

5. Water policies and regulation

5.1 Water Act (1998)

In South Africa, the Department of Water Affairs is governed by two Acts: the National Water Act (NWA), Act 36 of 1998 and the Water Services Act (WSA) 1997. The NWA redefined water rights in the country and established a new framework to mandate and regulate water resources. The WSA, promulgated in 1994, defined the role of DWA as regulator, the role of water boards as bulk providers and the role of municipalities as service providers. The DWA operates at the national, provincial and local levels across the water value chain. The water value chain includes water resource management, water abstraction, water processing and distribution of potable water, and the collection, treatment and discharge of wastewater. However, the DWA does not execute all of these functions as some are constitutionally assigned to appropriate sector partners.

5.2 National Water Resource Strategy (2012)

The National Water Resource Strategy (NWRS) has been developed to support the implementation of the NWA. The NWRS2 has three key objectives:

- Increase water's contribution to the economy and to job creation
- Protect, develop and control water resources in a sustainable and equitable manner
- Support the elimination of poverty and inequality.

5.3 Water Boards and municipalities

Water boards, municipalities and the DWA manage regional bulk water distribution. Water boards and some of the larger metropolitan municipalities (metros) are also responsible for purifying water to potable standards. Providing water services – which means water supply and sanitation – is the constitutional responsibility of local authorities such as metros, local or district municipalities. These local authorities act as WSAs and sometimes also as water service providers (WSPs) for all communities in their areas of jurisdiction.

5.4 Western Cape Sustainable Water Management Plan

The Sustainable Water Management Plan was developed in 2009 to offer short, medium and long-term guidelines for achieving integrated and sustainable management of water in the Western Cape.

The four strategic goals of the plan are:

- Ensure effective cooperative governance and institutional planning for sustainable water management.
- Ensure the sustainability of water resources for growth and development.
- Ensure the integrity and sustainability of socio-ecological systems.
- Ensure effective and appropriate information management, reporting and awareness-raising of sustainable water management.

In 2012 the Berg River Improvement Plan was implemented to address water quality concerns in the Berg River. The plan is essential to safeguard the Western Cape's agricultural exports.

6. Industry bodies and associations

6.1 Water Research Commission (WRC)

The WRC is a research and development organisation established in 1971 in terms of the Water Research Act. Its mandate includes:

- Promoting co-ordination, co-operation and communication in the area of water research and development,
- Establishing water research needs and priorities,
- Stimulating and funding water research according to priority
- Promoting effective transfer of information and technology,
- Enhancing knowledge and capacity-building within the water sector.

Website: www.wrc.org.za

6.2 Water Institute of Southern Africa (WISA)

WISA represents the whole water sector in Southern Africa. The Institute relies heavily on volunteers to fulfil its mandate, which is building expertise, sharing knowledge, and improving quality of life. eWISA is the capacity building, information and knowledge sharing arm of WISA. The eWISA website was established in May 2006 to provide a sustainable long term mechanism to increase the availability of water related information in Southern Africa and in Africa.

Website: www.ewisa.co.za

6.3 GreenCape Water Sector Desk

GreenCape is an agency under the Western Cape Department of Economic Development and Tourism, which serves as a platform for the water industry to access relevant information, source assistance in overcoming barriers, and connect to other stakeholders. The Water Sector desk works at identifying industry stakeholders and experts in the field to develop a deeper understanding of the business opportunities and challenges faced by industry in the region. It identifies potential projects around the water-energy nexus, while promoting water efficiency and the use of innovative and green technology within the province.

Website: water@greencape.co.za

6.4 Urban Water Management (UWM)

The UWM is an interdisciplinary group at the university of Cape Town, which seeks integrated sustainable solutions to the problems of water management in urban areas of southern Africa. It supports the holistic management of water in the urban environment so as to minimise the impact on rural water resources and maximise its utility within the town or city. Particular focus is placed on the urban drainage (sewerage and stormwater management) aspect of the urban water cycle, as this is more difficult to manage than the water supply side.

Website: www.civil.uct.ac.za

7. Garden Cities green building guidelines

Garden Cities (NPC) RF recommends the following water sensitive criteria and focus areas in the design and construction of its developments.

Criteria	Focus areas
Water efficiency	1. Understand and comply with City of Cape Town bylaws for water and wastewater.
Water wise installations	1. All new fittings and fixtures must comply with SABS/JASWIC requirements and comply with bylaws. 2. Ensure that the optimum pipe size and water pressure is used. 3. Avoid long “dead-leg” runs on hot water systems, which waste both energy and water. 4. Select fittings, fixtures and appliances with WELS certification. 5. Spec low flow shower heads on all showers. 6. Spec tap aerators on all taps. 7. Select low volume, dual-flush toilets. 8. Spec manual flush urinals. 9. Consider rainwater and recycling systems to augment potable water supply. 10. Consider communal laundries and wash bays. 11. Spec swimming pools with blankets and no requirement for backwashing.
Water sub metering	1. Install sub-meters on all substantive water demands, harvesting or recycling schemes and fire systems for communal buildings. 2. Install sub-meters on domestic dwellings for potable, non-potable and domestic hot water.
Alternative water supply	1. Consider rainwater harvesting systems. 2. Install greywater systems. 3. Consider boreholes and well points where relevant.
Alternative sanitation	1. Include reed-bed systems for passive water treatment. 2. Consider alternative sanitation options such as Biolytix systems. 3. Biogas digesters and commercial wastewater treatment plants (for larger buildings) to mitigate both water demand and sewer flows.

Stormwater	1. Mitigate stormwater run-off through permeable paving, swales and detention tanks/ponds. 2. Design surface drainage to slow stormwater run-off. 3. Collect rainwater and stormwater for re-use. 4. Mulch to present evaporation.
Water Wise Landscaping	1. Plant indigenous plants. 2. Create water wise gardens and consider xeriscaping. 3. Avoid large expanses of lawn. 4. Plant appropriate grass species.
Irrigation	1. Use drip or bubbler irrigation to reduce evaporative losses. 2. Install irrigation timers. 3. Use soil moisture monitors to avoid watering when rainfall has met the irrigation needs.