

# **CHAPTER ONE**

## **OVERVIEW OF THE SOUTH AFRICAN WATER SECTOR**

**THIS CHAPTER CONSISTS OF THREE SECTIONS:**

- |                   |   |
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| <b>Section 1:</b> | <b>Overall Water Situation in South Africa</b>            |
| <b>Section 2:</b> | <b>The South African Water Sector framework</b>           |
| <b>Section 3:</b> | <b>Challenges facing the water sector in South Africa</b> |

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# SECTION 1:

## OVERALL WATER SITUATION IN SOUTH AFRICA

### 1.1 OVERVIEW OF SOUTH AFRICA'S WATER SITUATION

South Africa is a semi-arid, water stressed country, with an average rainfall of about 450mm, which is well below the world average of about 860mm per year. Water availability across the country is faced with three major challenges:

- Uneven spatial distribution and seasonality of rainfall (43% of the rain falls on 13% of the land)
- Relatively low stream flow in rivers most of the time, which limits the proportion of stream flow that can be relied upon for use, and
- Location of major urban and industrial developments remote from the country's larger watercourses, which necessitates large-scale transfers of water across catchments.

About 70% of South Africa's gross domestic product is supported by water from the Limpopo, Inkomati, Pongola and Orange Rivers, which collectively drain two thirds of the land area. Judicious joint management of these rivers with the relevant neighbouring countries is therefore of paramount importance to South Africa. Although the National Government is the public trustee of the nation's water resources and the Minister is ultimately responsible for implementing water legislation, the management of water resources will take place at a regional scale in 19 Water Management Areas (WMAs) that cover the entire country.

The total natural runoff flowing along our rivers towards the sea amounts to some 50 billion cubic metres per year (on average), of which nearly 10% originates in Lesotho. Of the total runoff, a yield of some 14 billion cubic metres is available for use through dams, basin transfers and other water resource developments throughout the country. This is currently adequate to meet the country's total annual water requirement, which in 2000 was estimated at 13,28 billion cubic metres.

Prior to 1998, the management of water resources was mainly demand driven, with emphasis on the development of new water resources in

response to the socio-economic needs of the time and in line with the greatest perceived overall benefit. The new water management policy has a different emphasis; the National Water Act (No 36 of 1998) is concerned with (amongst other things) efficiency and sustainability of water use, redressing past imbalances with regard to access to water for all South Africans, and reserving sufficient water to maintain the natural environment.

Assurance of water supply for the future is not a problem unique to South Africa. It is estimated that by 2025, at least 3,5 billion people (nearly 50% of the world's population) will face water scarcity. In South Africa, it is estimated that, based on current usage trends, water demand will exceed availability of economically usable fresh water resources by 2025. The continuing trend in industrialization and urbanization of the population is expected to place further pressure on the country's sources of water supply unless appropriate corrective action is taken.

## **1.2 WATER AVAILABILITY**

The total surface water available in South Africa averages about 49 200 million m<sup>3</sup> per year, of which about 4 800 million m<sup>3</sup> per year originates from Lesotho. A portion of this runoff, known as the Ecological Reserve, needs to remain in the river in order to maintain the natural environment along the watercourse. The desired quantity varies from river to river, depending on the requirement to maintain the current environmental condition or future desired condition as determined by the stakeholders in the catchment. Provisional estimates for each of the 19 WMAs are listed alongside the natural runoff in Table 1 overleaf:

**Table 1: Natural Mean Annual Runoff and provisional estimates of Ecological Reserve (million m<sup>3</sup> per annum)**

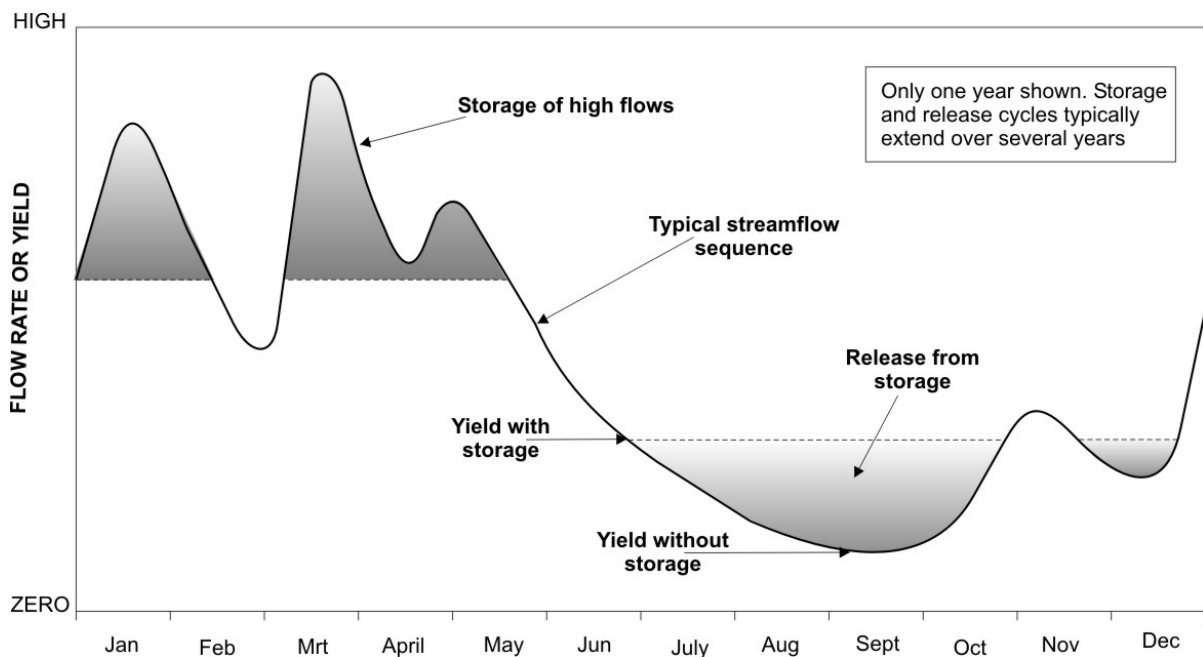
Water Management Area		Natural Mean Annual Runoff	Ecological Reserve	Difference	Total Local Yield
1	Limpopo	985	156	829	282
2	Luvuvhu/Letaba	1 185	224	961	310
3	Crocodile West and	855	165	690	693
4	Olifants	2 042	460	1 582	611
5	Inkomati	3 539	1 008	2 531	943
6	Usutu to Mhlatuze	4 780	1 192	3 588	1 010
7	Thukela	3 799	859	2 940	738
8	Upper Vaal	2 423	299	2 124	1 723
9	Middle Vaal	888	109	779	201
10	Lower Vaal	368	48	320	50
11	Mvoti to Umzimkulu	4 798	1 160	3 638	527
12	Mzimvubu to Keiskamma	7 241	1 122	6 119	855
13	Upper Orange	6 981	1 349	5 632	4 557
14	Lower Orange	502	69	433	(1 007)
15	Fish to Tsitsikamma	2 154	243	1 911	437
16	Gouritz	1 679	325	1 354	277
17	Olifants/Doring	1 108	156	952	335
18	Breede	2 472	384	2 088	868
19	Berg	1 429	217	1 212	501
<b>Total for SA</b>		<b>49 228</b>	<b>9 545</b>	<b>39 683</b>	<b>13 911</b>

Although the difference between natural runoff and ecological reserve is significant for each catchment, only a portion of this difference can practically and economically be harnessed into usable yield, as illustrated in the last column of the Table. The yield is the constant rate of water that can be abstracted from a river with a given degree of assurance throughout the year. The yield can vary considerably between an unregulated and regulated river, as explained in the Box overleaf:

## BOX 1: YIELD, RELIABILITY, AVAILABLE WATER AND ASSURANCE OF SUPPLY

The yield from a water resource system is the volume of water which can be abstracted at a certain rate over a specified period of time (expressed in million m<sup>3</sup> per year). For domestic, industrial and mining use, water is required at a relatively constant rate throughout the year, whereas strong seasonality occurs with respect to irrigation. Because of the typical large fluctuations in stream flow in South Africa as demonstrated (for a 12 month period) in the diagram below, the highest yield which can be abstracted at a constant rate from an unregulated river, is equal to the lowest flow in the river. With regulation by dams, water can be stored during periods of high flow for release during periods of low flow, as shown by the dotted lines on the diagram, thereby increasing the rate at which water can constantly be abstracted and therefore the yield. The greater the storage, the greater the yield which can be abstracted, within certain limits.

### Diagrammatic presentation of streamflow and storage.



As rainfall, runoff and thus stream flow vary from year to year, low flows (and floods) are not always of the same duration and severity. The amount of water that can be abstracted without failure (the yield), therefore also varies from year to year. A yield which can be abstracted for 98 years out of 100 years on average, is referred to as the yield at a 98% assurance of supply. Implicit to this is the acceptance that some degree of failure with respect to supplying of the full yield, will on average occur 2 years out of 100 years. For a specific river and water resource infrastructure, the higher the assurance of supply required (or the smaller the risk of failure which can be tolerated), the smaller the yield which can be abstracted, and vice versa. For the purposes of the NWRS, all quantities have been adjusted to a 98% assurance where applicable.

Available water refers to all water which can be available for practical application to desired uses. The total yield locally available includes the yield from both local surface water and groundwater resources as well as contributions to the yield by usable return flows from the non-consumptive component of upstream water use in the area under consideration. Total water available includes the total local yield plus water transferred from elsewhere.

Surface water resources are the main source of water supply in South Africa, providing just under 11 000 m<sup>3</sup>/a. Although groundwater only provides about 10% of this volume, it is extensively utilized, particularly in rural and arid areas. Relative to groundwater, a significant contribution to available yield comes from return flows, which are flows returned to streams from major urban and industrial developments. The relative contributions to yield between surface, groundwater and return flows are illustrated in the Table 2 below.

**Table 2: Available yield in the year 2000 (million m<sup>3</sup>/a)**

Water Management Area		Natural Resource		Usable Return Flow	Total local yield
		Surface Water	Ground Water		
1	Limpopo	160	98	24	282
2	Luvuvhu/Letaba	243	44	23	310
3	Crocodile West & Marico	202	111	380	693
4	Olifants	409	99	103	611
5	Inkomati	857	9	77	943
6	Usutu to Mhlatuze	920	39	51	1 010
7	Thukela	666	15	57	738
8	Upper Vaal	1 173	32	518	1 723
9	Middle Vaal	83	54	64	201
10	Lower Vaal	(135)	126	59	50
11	Mvoti to Umzimkulu	433	6	88	527
12	Mzimvubu to Keiskamma	777	21	57	855
13	Upper Orange	4 420	65	72	4 557
14	Lower Orange	(1 108)	24	77	(1 007)
15	Fish to Tsitsikamma	265	36	136	437
16	Gouritz	191	64	16	277
17	Olifants/Doring	266	45	24	335
18	Breede	687	109	72	868
19	Berg	419	45	37	501
<b>Total for Country</b>		<b>10 928</b>	<b>1 042</b>	<b>1941</b>	<b>13 911</b>

**NB:** Figures in brackets denote that evaporation and seepage losses exceed the yield contributed by local runoff.

### 1.3 WATER REQUIREMENTS

There are six major water use sectors, namely, irrigation, urban use, rural use, mining and bulk industrial, power generation, and afforestation. The combined total water requirement for all user sectors for the year 2000 is 13 280 million m<sup>3</sup>/a. The breakdown, per sector and per WMA, is listed in Table 3 below.

**Table 3: Water Requirements per sector (2000)**

Water Management Area		Irrigation	Urban	Rural	Mining & Bulk Industrial	Power Generation	Afforestation	Total Local Requirements
1	Limpopo	238	37	28	14	7	1	325
2	Luvuvhu/Letaba	248	11	31	1	0	43	334
3	Crocodile West & Marico	445	691	38	127	27	0	1 328
4	Olifants	557	92	44	94	181	3	971
5	Inkomati	737	65	24	24	0	198	1 048
6	Usutu to Mhlatuze	404	54	40	91	0	104	693
7	Thukela	204	56	31	46	1	0	338
8	Upper Vaal	114	795	42	173	80	0	1 204
9	Middle Vaal	159	112	32	86	0	0	389
10	Lower Vaal	525	78	44	6	0	0	653
11	Mvoti to Umzimkulu	207	438	44	74	0	65	828
12	Mzimvubu to Keiskamma	190	100	39	0	0	46	375
13	Upper Orange	777	129	60	2	0	0	968
14	Lower Orange	780	28	17	9	0	0	834
15	Fish to Tsitsikamma	763	116	16	0	0	7	902
16	Gouritz	254	57	11	6	0	14	342
17	Olifants/Doring	356	7	6	3	0	1	373
18	Breede	577	43	11	0	0	6	637
19	Berg	301	423	14	0	0	0	738
<b>Total for Country</b>		<b>7 836</b>	<b>3 332</b>	<b>572</b>	<b>756</b>	<b>296</b>	<b>488</b>	<b>13 280</b>

Agricultural irrigation represents approximately 60% of the total water requirement, followed by urban requirements constituting 25%, the remaining 15% being shared by the other four sectors.



## 1.4 RECONCILIATION OF SUPPLY AND DEMAND

For the year 2000, the total water requirements exceed available water in eleven of the nineteen WMAs, although a surplus exists for the country as a whole, as illustrated in the Table 4 below.

**Table 4: Reconciliation of water availability and requirements for 2000  
(million m<sup>3</sup>/a)**

Water Management Area		Reliable* Local Yield	Transfers In	Local Requirements	Transfers Out	Balance
1	Limpopo	282	19	325	0	(24)
2	Luvuvhu/Letaba	310	0	334	13	(37)
3	Crocodile West & Marico	693	656	1 328	10	11
4	Olifants	611	172	971	8	(196)
5	Inkomati	943	0	1 048	148	(253)
6	Usutu to Mhlatuze	1 010	32	693	114	235
7	Thukela	738	0	338	497	(97)
8	Upper Vaal	1 723	1 443	1 204	1 481	481
9	Middle Vaal	201	791	389	605	(2)
10	Lower Vaal	50	651	653	0	48
11	Mvoti to Umzimkulu	527	34	828	0	(267)
12	Mzimvubu to Keiskamma	855	0	375	0	480
13	Upper Orange	4 557	2	968	3 105	486
14	Lower Orange	(1 007)	1 886	834	54	(9)
15	Fish to Tsitsikamma	437	571	902	0	106
16	Gouritz	277	0	342	1	(66)
17	Olifants/Doring	335	3	373	0	(35)
18	Breede	868	1	637	203	29
19	Berg	501	203	738	0	(34)
<b>TOTAL FOR COUNTRY</b>		<b>13 911</b>	<b>0</b>	<b>13 280</b>	<b>124</b>	<b>504</b>

\*The amount that can be reliably provided 98 years out of 100

In many cases this does not mean that the actual use exceeds supply, but that the estimated ecological reserve, which is included in the total requirement, cannot be satisfied (the ecological reserve estimate is listed in Table 1 above). These estimates could change after a comprehensive reserve determination is undertaken in each WMA. An overall surplus or deficit for a WMA also tends to mask the actual situation at sub-catchment level, where the reverse situation may be applicable. It is often not practical or

economically viable to simply transfer water from areas of surplus to areas of deficit. In general imbalances within a WMA will be addressed by the catchment management strategy for that WMA, when it is developed.

Although natural stream flow characteristics have been significantly altered as a result of upstream regulation and use, some water is still available for allocation to new uses. However, additional storage infrastructure may be required to make this feasible. The 66% of natural river flow that remains in our rivers on average (after allowing for abstraction and evaporation) substantially serves to meet the requirements of the Reserve and to honour downstream international obligations.

## **1.5 FUTURE PERSPECTIVE ON WATER AVAILABILITY AND REQUIREMENTS**

The main factors that influence future water requirements are:

- Climate
- Nature of economy (irrigated agriculture, industrialization)
- Standards of living
- Population growth
- Economic growth

There are sufficient water resource developments to ensure that all current requirements for water are reasonably met. The acceleration in the supply of potable water to millions of South Africans in rural areas is not expected to have a significant impact on water availability. However, trends towards industrialization of the economy and urbanization of the population are likely to affect the country's water resources in the medium to long term. In fact, from demographic projections, future growth in water requirements is expected to be largely in the main metropolitan areas.

Based on a range of scenarios for population and economic growth, estimates of future requirements were made for the period until 2025. The most likely estimates of future water requirements were based on a high population growth and a more equitable distribution of wealth, leading to higher average levels of water service. Table 5 below provides the results of this base scenario.

In general, sufficient resources are available to meet all priority requirements for the next 25 years, provided they are well managed. Existing surpluses will generally be taken up in the foreseeable future by growth in the domestic,

urban, industrial and mining requirements for water. Although there are no significant changes from the 2000 situation (see second last column), deficits are generally expected to increase and surpluses to diminish. The main challenge will be to ensure that water is available where it is needed.

With regard to improving existing use to make water available for future use, agricultural irrigation merits serious consideration. As the single largest user sector (60% of total), the direct contribution by the agricultural sector to the gross domestic product is only about 4,5%, of which only 25 to 30% is from irrigated agriculture. Employment in the agricultural sector accounts for some 11% of total national employment, but only 10 to 15% of total agricultural employment is in irrigated agriculture, where bulk of the water requirement is.

Estimates for future water resource potential show that the yield from surface water can be increased by about 5 600 million m<sup>3</sup> per year (see Table 5). Substantial volumes of water can also be made available through the increased re-use of return flows, especially at some coastal cities where potentially re-usable wastewater is currently discharged to sea. There is also potential for further groundwater development, although on a smaller scale. Although relatively expensive, desalination is becoming a realistic alternative for coastal users as technology improves.

The high scenario for 2025 (last row in Table 5) projects a dramatic increase in water requirements. This serves as a conservative indicator of unexpected shortages and will test the resilience of proposed strategic plans regarding water resource development (such as construction of new dams and possible water transfer infrastructure). The scenario estimates cannot be regarded as conclusive because they do not take into account the impacts of complimentary strategies such as water conservation and demand management, and the impacts of comprehensive ecological reserve determinations.

## 1.6 RESOURCE DEVELOPMENT OPPORTUNITIES

Strategic opportunities for further resource development have been identified in the following catchments:

- Luvuvhu/Letaba
- Thukela
- Mvoti to Mzimkulu
- Mzimvubu to Keiskamma
- Upper Orange

Opportunities for increased water use, pursuant to resource development, include the following:

- Expansion of irrigation in the Lower Orange and Fish to Tsitsikamma water management areas with water from the Upper Orange water management area.
- Expansion of irrigation below Pongolapoort Dam in the Usutu to Mhlathuze water management area.
- Refurbishment of irrigation schemes and additional development in the Mzimvubu to Keiskamma water management area, as well as some limited hydropower generation.
- Expanded forestry development in some catchments in the Usutu to Mhlathuze, Thukela, Mvoti to Umzimkulu and Mzimvubu to Keiskamma water management areas.
- Expansion of irrigation in the northeastern part of Limpopo Province (from the Nandoni Dam in the Luvuvhu River).

**Table 5: Reconciliation of water requirements and availability for the year 2025 (base scenario)**

Water Management Area		Reliable local yield	Transfers in	Local requirements	Transfers out	Balance (2025)	Balance (2000)	Potential for development
1	Limpopo	281	18	347	0	(48)	(24)	8
2	Luvuvhu/Letaba	403	0	349	13	41	(37)	102
3	Crocodile West and Marico	805	901	1 594	10	102	11	0
4	Olifants	630	210	1 075	8	(243)	(196)	239
5	Inkomati	1 073	0	1 088	148	(163)	(253)	114
6	Usutu to Mhlathuze	1 011	32	700	114	229	235	110
7	Thukela	742	0	347	497	(102)	(97)	598
8	Upper Vaal	1 818	1 743	1 440	2 042	79	481	50
9	Middle Vaal	205	775	400	580	0	(2)	0
10	Lower Vaal	48	648	645	0	51	48	0
11	Mvoti to Umzimkulu	555	34	1 012	0	(423)	(267)	1 018
12	Mzimvubu to Keiskamma	872	0	413	0	459	480	1 500
13	Upper Orange	4 799	2	1 022	3 496	283	486	900
14	Lower Orange	(1 001)	1 931	883	54	(7)	(9)	150
15	Fish to Tsitsikamma	452	595	979	0	68	106	85
16	Gouritz	278	0	353	1	(76)	(66)	110
17	Olifants/Doring	335	3	371	0	(33)	(35)	185
18	Breede	869	1	639	203	28	29	197
19	Berg	506	203	829	0	(120)	(34)	210
<b>Total for Country (base scenario)</b>		<b>14 681</b>	<b>0</b>	<b>14 486</b>	<b>124</b>	<b>68</b>	<b>504</b>	<b>5 576</b>
<b>Total for Country (high scenario)</b>		<b>15 460</b>	<b>0</b>	<b>17 248</b>	<b>124</b>	<b>(1 915)</b>		<b>5 576</b>

## 1.7 OPTIONS FOR RECONCILING WATER REQUIREMENTS WITH AVAILABILITY

There are several options or interventions that may be used, either independently or in combination, to obtain a balance between water requirements and availability, for instance:

- Demand management – Management of the demand (requirements) for water has been applied with great success by some users and could be used at water management area level to move from deficit to surplus.
- Resource management – Regulation of stream flow through storage and the control of abstractions and releases, to provide appropriate quantities of water at specific times and locations (inter-basin transfers), and of such quality and reliability to meet user requirements is the traditional approach.
- Development of surface water resources – there is substantial potential for further development of surface water resources in some parts of the country, through construction of storage and transfer infrastructure.
- Inter-catchment transfers – refers to the transfer of water from a donor catchment (which has the ability to sustain water requirements for the catchment area after such transfer) to a recipient catchment (which requires more water to fulfil the demand in that catchment area). These inter-catchment transfers will be necessary in many cases in South Africa.
- Managing groundwater resources – Potential exists in certain areas for larger scale development of groundwater resources.
- Re-use of water – While most water used in a non-consumptive manner is directly recycled for re-use or returned to the rivers for re-use elsewhere, there is further potential, particularly in coastal areas where wastewater is directly discharged to sea.
- Control of invasive alien vegetation – estimates suggest that close to 3% of the national mean annual runoff is intercepted by invasive alien vegetation. Removal and containment of such vegetation may contribute to catchment management strategies.
- Re-allocation of water – The re-allocation of water between user sectors is an obvious and powerful option. The National Water Act provides for the re-allocation of water to be gradually introduced as the need arises in different parts of the country using pricing,

compulsory licensing, water demand management, and trading of water use authorisations.

- Water quality considerations – Although not a reconciliation intervention in itself, water quality is a fundamental concern in water resources management. In addition to making sufficient quantities of water available for use at specific locations and times as required, reconciliation strategies must ensure that water is of appropriate quality for the intended uses.

Other factors that can significantly influence water availability include:

- Land use – Land use practices can alter the proportion of rainfall that reaches surface streams or penetrates to groundwater. Land uses which may influence water availability include afforestation, alien vegetation, dry-land cultivation of crops, grazing practices, urban development, and soil erosion resulting in reservoir sedimentation.
- Climate change – There is evidence that global temperatures are rising, with some climatic models suggesting that this could cause a decrease in runoff in South Africa, spreading progressively from west to east during the next few decades.

## SECTION 2:

# THE WATER SECTOR FRAMEWORK IN SOUTH AFRICA

There has been a marked transition, in relation to policy, goals and objectives, indicative upon examination of the “old” 1956 Water Act as compared to the “new” National Water Act of 1998, and the series of pursuant related legislation, all of which bear a distinct flavour of change and advancement. The primary focus within the water sector is to ensure provision of basic water and sanitation services to all, and this resonates the constitutional demand of every citizen’s right of access to water. It is this constitutional imperative which had initiated the promulgation of our new water legislation. This legislation has already come far in setting the framework of change towards constitutional fulfillment.

### 2.1. LEGISLATIVE FRAMEWORK FOR THE WATER SECTOR

The Water Services Act (No 108 of 1997) and the National Water Act (No 36 of 1998) provide the basis for the legislative framework within which water supply and sanitation services, water resource management and water use need to take place. In addition to these Acts, there are a number of associated pieces of legislation that contribute toward the defining of the legislative framework. These are discussed under the broad headings of legislative framework for water, sanitation and forestry; and legislation impacting on water services.

#### 2.1.1 LEGISLATIVE FRAMEWORK FOR WATER, SANITATION AND FORESTRY

##### **National Water Act (No 36 of 1998)**

This Act legislates and provides the framework for the way in which water resources must be protected, used, developed, conserved, managed and controlled. In addition to Section 27, this Act also gets its mandate from Section 24 of the Bill of Rights in the Constitution, which states that everyone has the right to an environment that is not harmful to their health or well being, and to have the environment protected for the benefit of present and future generations through reasonable legislative and other measures that:



- Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development
- Prevent pollution and ecological degradation
- Promote conservation.

The purpose of the National Water Act is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways that take account of:

- Meeting basic human needs
- Promoting equitable access to water
- Redressing the results of past racial and gender discrimination
- Promoting the efficient, sustainable and beneficial use of water
- Facilitating social and economic development
- Providing for growing demand for water use
- Protecting aquatic and associated ecosystems
- Reducing and preventing pollution and degradation of water resources
- Meeting international obligations
- Promoting dam safety
- Managing floods and droughts
- Establishing suitable institutions, and to ensure that they have appropriate community, racial and gender representation.

### **National Forests Act (No 84 of 1998)**

The purpose of this Act is to ensure that South Africa's forest resources (indigenous forests and plantations) are protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner, for the benefit of all. Indigenous forests are administered concurrently between national and provincial governments. When the Minister of Water Affairs and Forestry is certain that sufficient expertise, resources and administrative capacity exists in the provinces, he/she may assign or delegate the responsibility for managing indigenous forests to the provinces.

### **2.1.2. LEGISLATION IMPACTING ON WATER SERVICES**

#### **Water Services Act (No 108 of 1997)**

The overall objective of the Water Services Act is to assist municipalities to undertake their role as water services authorities, and to look after the interests of consumers. It also clarifies the role of other water services

institutions, such as water services providers and water boards. This Act gets its mandate from Section 27 of the Bill of Rights in the Constitution which states that everyone has the right to have access to sufficient food and water, and the State must take reasonable legislative and other measures to achieve the progressive realization of these rights.

The main objects of this Act are to provide for:

- Right of access to basic water supply and basic sanitation
- Setting national standards and norms for tariffs
- Preparation of water services development plans
- Regulatory framework for water services institutions
- Establishment of water boards and water services committees
- Monitoring of water supply and sanitation services
- Financial assistance to water services institutions
- Accountability of water services providers
- Intervention by the Minister or relevant province
- A national information system
- Promotion of effective water resource management

The Act further:

- establishes institutional arrangements for water services provision
- sets out the role of water sector institutions
- sets out the requirements for planning and co-ordination by requiring that each water board compile a water board business plan and that every water services authority compile a water services development plan

### **Municipal Structures Act (No 117 of 1998)**

Also known as the “Structures Act”, this Act deals with the following:

- It sets up the basis for establishment of new municipalities in the A, B and C categories (Metropolitan, Local and District, respectively)
- It defines the way municipalities are to be established
- It establishes the way councils are to function
- It determines the division of powers and functions between municipalities. In this regard, District Municipalities are responsible for bulk water supply, bulk sewage purification works and sewage

disposal that affect a significant proportion of local municipalities. The remaining functions are delegated to local municipalities.

### **Municipal Structures Amendment Act (No 33 of 2000)**

The Structures Amendment Act assigns the responsibility for “potable water systems” and “domestic sewage and wastewater” to category C (District) municipalities, which includes the water services authority function. The Act does however make provision for category B (Local) municipality to perform the water services authority function but only if authorized by the Minister of Provincial and Local Government. The status of municipalities, in terms of their authority function, assigned to them prior to the enactment of the Amendment Act was maintained, until the Minister finalized the allocation of powers and functions in terms of the Amendment Act. In this regard the allocation of powers and functions to Category B and C municipalities was finalized in February 2003.

### **Municipal Systems Act (No 32 of 2000)**

This Act focuses on the internal systems and administration of a municipality, covering:

- Public involvement and accountability in policy formulation and decision making
- Guidelines for making bylaws
- Establishing Integrated Development Plans
- Establishing a performance management system

Key aspects of this Act that impact on water services are as follows:

- The Act makes a distinction between services authority and services provider functions, to be in line with the Water Services Act
- The importance of alternative mechanisms for providing services is recognized. Requirements for entering into partnerships with others are outlined e.g. for a services authority entering into a contract with a services provider.
- New institutional entities are introduced which may be applied to service delivery (multi-jurisdictional service districts, municipal business enterprises, service utilities)

## **New White Paper on Water Services**

This White Paper (October 2002) has been developed through a consultative process. It sets out a comprehensive policy approach with respect to the whole of the water services sector in South Africa, ranging from small community water supply and sanitation schemes in remote rural areas to large regional schemes supplying water and wastewater services to people and industries in our largest urban areas.

It is now more than seven years since the first Water Supply and Sanitation White Paper was published in November 1994 (referred to hereafter as the 1994 White Paper). Much has been achieved in these seven years, including establishment of an enabling policy framework. For this reason, the 1994 White Paper was focussed on the establishment of a new national water department and its role in assuming a direct delivery function on behalf of national government to provide basic water and sanitation services rapidly to people living primarily in rural areas. Since 1994, the context has changed significantly. In this regard there has been a process to transform local government, a revision of water sector and related policies (free basic water, municipal services partnerships, etc.), advancements with respect of the institutional frameworks and a new financial framework for the provision and development of water services.

The key changes in the new White Paper when compared to the 1994 White Paper are that:

- This white paper is a comprehensive policy paper for the water services sector as a whole.
- Local government is now the key focus for delivery.
- The roles given to water boards in the 1994 White Paper and the Water Services Act are reviewed.
- DWAF will become a sector leader, supporter and regulator (rather than an operator).
- The role of the private sector is clarified.
- The financial policy framework reflects the consolidation of national government funding to local government through the equitable share and the municipal infrastructure grant (MIG).
- More emphasis is placed on sustainability and the ongoing provision of efficient and reliable services.

- The interface between water services and water resources bears particular reference to water services development plans, integrated development plans, and catchment management strategies.

The provision of at least a basic water and sanitation service to all people living in South Africa still remains an important policy priority. The Government is committed to reducing the backlog in services by 2008 in the case of water and 2010 in the case of sanitation. Sustainability requires that services are affordable. For this reason, there is also a policy of free basic water and sanitation services, which means that everybody in South Africa has a right to a basic amount of water and a basic sanitation service that is affordable

## **2.2. INSTITUTIONAL FRAMEWORK FOR THE WATER SECTOR**

The process to reform the South African water sector, post 1994, has seen the redefinition of the roles of many of the existing water sector institutions and the introduction of others. This section outlines the institutions and their roles as set out in the relevant sector legislation.

### **2.2.1. THE DEPARTMENT OF WATER AFFAIRS AND FORESTRY**

The Department of Water Affairs and Forestry is the national custodian or trustee of South Africa's water and forestry resources. It is primarily responsible for the formulation and implementation of policy governing these two sectors, as well as regulation of the sectors. It also has the overriding responsibility for water services provided by local government, and currently operates water resource infrastructure (such as dams), bulk water supply schemes and some retail infrastructure (providing services directly to consumers).

#### **Water Resource Management and Water Services Objectives**

The Department's key objectives operate within a medium-term (four to five year) time frame. Much of the work associated with their achievement is already underway. The Department's objectives, in respect of water resource management and water services are:

##### **Water Resource Management**

- establishment of a National Water Utility.
- Implement the provisions of the National Water Act, *inter alia* :-

- Develop and establish the National Water Resource Strategy and Catchment Management Strategies;
- Establish, empower and capacitate water management institutions;
- Continue the development of, and implement a pricing strategy for water use charges;
- Continue the development of, and implement water resource protection measures;
- Progress registration of water use;
- Develop a strategy for compulsory water use licensing;
- Develop and implement water conservation and demand management strategies;
- Continue the development and establishment of, and maintain national water resource monitoring and information systems.
- Implement a national programme for clearing invading alien plants (Working for Water Programme).
- Develop and establish a national water resource management/water services co-ordination structure.
- Position the Department as national water resource management policy development, regulatory, monitoring and support institution.

#### Water Services

- Undertake interventions to provide basic water services – supply of potable water, and sanitation services – to the previously disadvantaged population. Realign the programme to achieve sustainability, effectiveness, efficiency and affordability of services.
- Promote the transfer of water services schemes currently operated by the Department to appropriate water services institutions.
- Monitor and guide the activities of water boards.
- Support Local Authorities in developing capacity to undertake water services provision, including the preparation of Water Services Development Plans.
- Develop and establish water services monitoring and information systems.
- Review the approach to sanitation services provision to achieve sustainability, effectiveness, efficiency and affordability of services.
- Position the Department as national water services policy development, regulatory, monitoring and support institution.

## **Directorates Impacting on Catchment Management**

The Department is in the process of undergoing major restructuring, which means that the present Directorate structure will change in due course. However, some of the main current Directorates that bear relevance to the CMA process are:

### **Water Management Institution Governance:**

This Directorate will provide support to the regional offices and the relevant head office Directorates in the implementation of the National Water Act by:

- Developing and monitoring the implementation of policies, guidelines, procedures and providing capacity building and training to facilitate the establishment and operation of sustainable, representative and developmental Water Management Institutions;
- Co-ordinating the development and implementation of Catchment Management strategies;

This will be done in consultation with relevant stakeholders, including regional offices, relevant head office Directorates and other government departments. The Directorate strives for excellence and innovation in contributing to the achievement of integrated water resources management and the beneficial use of water in the public interest.

### **Water Use Efficiency:**

This Directorate aims to promote and institutionalise water conservation and water demand management through the following aspects:

- Develop policies, strategies and regulations.
- Integrate WC / DM into all relevant departmental functions.
- Undertake education, capacity building, awareness creation, marketing and communication activities
- Provide support to water services institutions
- Develop sectoral WC / DM strategies: Mining, Power and Industry, Agriculture and Forestry
- Undertake monitoring and evaluation.
- Promote international Cupertino.

#### Water Utilisation:

This Directorate aims to promote equitable allocation, and beneficial and sustainable utilisation of water resources through the following activities:

- Promote efficient use of water for irrigation.
- Implement raw water pricing strategy.
- Review catchment and systems operation.
- Promote water loss control in bulk water systems.
- Develop strategic framework for stream flow reduction activities.
- Register and authorise water use: water abstraction and storage.

#### Resources Protection and Waste:

This Directorate aims to promote integrated sustainable protection and management of the water quality of water resources through the following activities:

- Develop water quality elements of NWRS.
- Develop policies and strategies for water resource protection.
- Develop pollution prevention strategies, guidelines and support.
- Review licensing procedures.
- Develop pricing strategy for waste discharges and provide financial assistance for water quality protection.
- Monitor, audit and assess Regional offices

#### Chief Directorate: Information Management

The core functions and responsibilities of this Chief Directorate are to monitor and assess water resources, provide scientific and technical support for water resources management, and undertake development in support of water resources management, through the following activities:

- Maintain national and regional resource monitoring networks.
- Maintain water resource and related databases, digital cartographic data and geo-spatial data systems.
- Assess license applications.
- Implement Resource Directed Measures.
- Provide analytical laboratory services.
- Undertake water quality assessments.
- Provide geo-hydrological services.
- Provide survey and mapping services.
- Provide hydrological services.



- Provide environmental services.
- Undertake special surveys.
- Develop information systems and tools for implementation of provisions and requirements of the National Water Act.
- Develop resource monitoring and assessment strategies.

## 2.2.2 WATER MANAGEMENT INSTITUTIONS

National Government is the public trustee of the nation's water resources, and is ultimately responsible for ensuring that South Africa's water resources are protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner, for the benefit of all persons, and in accordance with its constitutional mandate. The Government also has the power to regulate the use, flow and control of all water in the Republic. The Minister of Water Affairs and Forestry is ultimately responsible to ensure that water is allocated equitably and used beneficially in the public interest, while promoting environmental values.

An important facet of the new water policy is to delegate water resource management functions to appropriate institutions. In this regard, the Act provides for four types of water management institutions:

- Catchment Management Agency (CMA)
- Water User Association (WUA)
- A body responsible for international water management
- Any person who fulfils the functions of a water management institution in terms of the Act.

### Catchment Management Agencies

The main purpose of establishing CMAs is to delegate water resource management to a regional (catchment) level, and to involve local communities in the process. The country is divided into 19 Water Management Areas (WMA), each of which will have its own CMA. The initial functions of a CMA are to:

- Investigate and advise on the protection, use, development, conservation, management and control of the water resources in its WMA
- Develop a catchment management strategy
- Co-ordinate the activities of water users and water management institutions in its WMA

- Promote the implementation of any development plan established under the Water Services Act, such as a water services development plan
- Promote community participation in the protection, use, development, conservation, management and control of water resources in its WMA

### **Water User Associations**

Water user associations are co-operative associations of individual water users who wish to undertake water related activities for their mutual benefit. They operate at a localized level, and are particularly tailored for the management of local water resources and associated infrastructure. Their core function is usually to ensure fair and reliable water supply to its members, mostly irrigation or livestock farmers, whose livelihoods depend directly on predictable and reliable water supply. The National Water Act (NWA) provides for the establishment of WUAs to perform this function and allows WUAs to take on ancillary functions, as long as these additional functions does not jeopardise the ability of the WUA to perform its core function(s).

The most common ancillary functions taken on by WUAs in the new dispensation are the following:

- catchment management functions, delegated to a WUA which has sufficient capacity to perform such functions (typically a former Irrigation Board);
- agricultural functions (typically in the case of revitalised smallholder schemes, where large numbers of small farmers may have a need for joint purchasing of agricultural services or inputs);
- bulk municipal or domestic water supply functions (authorised by a Water Services Authority); or
- development support to assist the establishment of historically disadvantaged farmers.

### **2.2.3 WATER SERVICES INSTITUTIONS (WSI)**

The Water Services Act provides for four different water services institutions:

- Water Services Authority

- Water Services Provider
- Water Board
- Water Services Committee

The Act also provides for a water services intermediary, although it is not officially a WSI. The main features of each institution are summarized in the Table below:

Water Services Institution	Main Features
<b>Water Services Authority (WSA)</b>	<ul style="list-style-type: none"> <li>• A municipality responsible for ensuring access to water supply and sanitation services</li> <li>• Must be a municipality and no other institution – category A, C or B (if authorized by Minister (DPLG))</li> <li>• May itself perform functions of water services provider, or enter into contract/joint venture with another WSP</li> </ul>
<b>Water Services Provider (WSP)</b>	<ul style="list-style-type: none"> <li>• Provides the water supply and sanitation services (physically) to consumers under contract to the WSA</li> <li>• WSP function can be performed by municipality, water board, non-governmental organization, community-based organization, private sector company, or any other private or public body</li> <li>• No person may operate as WSP without approval of WSA</li> </ul>
<b>Water Board (WB)</b>	<ul style="list-style-type: none"> <li>• Is established by the Minister of Water Affairs &amp; Forestry</li> <li>• Primary function: to provide water services to other WSIs</li> <li>• Is a public water services provider</li> <li>• May perform secondary activities if primary functions and financial standing not compromised – examples <ul style="list-style-type: none"> <li>- Provide management services, training and other support services</li> <li>- Supply untreated water not for household purposes</li> <li>- Provide catchment management services</li> <li>- Provide water supply and sanitation services in a joint venture with WSAs</li> <li>- Perform water conservation functions</li> <li>- With approval of the WSA, supply water directly for industrial use, accept industrial effluent, act as WSP to consumers</li> </ul> </li> </ul>
<b>Water Services Committees (WSC)</b>	<ul style="list-style-type: none"> <li>• A statutory committee that may be established by the Minister should a WSA fail in its duty</li> <li>• WSC does <b>not</b> refer to a community based organization that performs a WSP function at community level (rural)</li> </ul>
<b>Water Services Intermediary</b>	<ul style="list-style-type: none"> <li>• A person or body providing water to people as a minor part of a contract (eg farmer to labourers, landlord of flats to tenants, mining company to employees in housing)</li> <li>• Only applicable where there is an obligation by one party to provide services to another as part of a contract</li> </ul>

## SECTION 3:

# CHALLENGES FACING THE WATER SECTOR IN SOUTH AFRICA

Despite the innovative transformation brought about by new water policy and legislation in the history of water management in South Africa, the challenges that face us are enormous to say the least. Managers, scientists, engineers, government officials, must harness all our creativity and energy to ensure sustainable water use now, and in the future.

### 3.1 POVERTY

The eradication of poverty is the most profound challenge facing South Africa today. High levels of poverty are compounded by high levels in inequality, and lack of access to natural, political and financial resources in certain sectors. Those facing the highest risk of poverty and marginalisation are women, women-headed households, the young, the elderly, African and rural people.

Poverty is one of the root challenges for the water sector, manifesting itself in the inability to pay for water services. Water resources management and water services are simply different elements of the same supply chain, therefore the effects of poverty are directly relevant to water resources management.

Based on 1994 data, the UNDP listed South Africa as 90 on the Human Development Index (Medium Human Development). The most recent UNDP listings however, place South Africa as number 101 out of 174 countries. This fall is attributable mainly to the AIDS epidemic.

### 3.2 ACCESS TO WATER

Access to water was one of the key needs identified by poor communities in 1994. Only 44,7% of South Africans households have a tap inside their dwellings. 16,7% have a tap in the yard, 19,8% fetch water from a public tap, and over 14% access water from dams, river, boreholes, rainwater or water carriers or tankers.

The challenge is to develop water resources management as a tool, and not an end in itself – as an element in the struggle to build a socially and environmentally just society, in which there is no more poverty, and in which all human beings have sufficient food and water, a place to live, a job, a clean and healthy environment, education, and a chance for a life of dignity and self fulfillment.

### **3.3 IMPACT OF ECONOMY ON WATER**

We must enable our economy to grow, because of dire human need. We need increased industrialisation, intense agriculture, and more jobs. All jobs, be they in industry, mining, agriculture, business, or tourism are dependent in some way on the use of water. The growing economy that we need will, therefore, place even greater demands on our already stressed water resources. We will face increasing inability to meet the growing demands. Within 20 – 25 years the problem could be extremely severe.

### **3.4 WATER RE-USE**

We need to recycle more water than we do at present. A number of other countries have less water per capita than we do, and yet they manage to maintain a strong economy and a high standard of living. Seventy percent of Israel’s wastewater is treated and used for agricultural irrigation, and estimates reveal that we may see 80% recycling within the next few decades.

This approach to treating wastewater and using it for irrigation provides a win-win situation, both reducing the amount of wastewater to be disposed of and providing a reliable and regular source of water for agriculture.

### **3.5 WATER DEMAND MANAGEMENT**

There are two distinct components to successful water demand management. The first is the development of viable alternatives by a technocratic elite – this requires the development of scientists, engineers, and technological capacity. The international water sector and foreign donors can play a large part in assisting us to achieve this.

The second is a social component which can be defined as the “willingness and ability of the social entity concerned to accept the technically generated solutions as being both reasonable and legitimate” – or winning the hearts

and minds of those who are going to have to use less water, or use it more efficiently. This component is highly dynamic in nature, and one around which there is relatively little understanding in South Africa.

### **3.6 “WATER WARS”**

External threats are not the only potential source of conflict over scarce water resources. Internally, a great deal of water is transferred between basins, not always to the liking of the stakeholders in the catchment from which the water is taken. In a situation of increasing water scarcity, and an increasing need for water demand management, such tensions must be understood and managed.

In the light of increasing demands on our limited water resources, a major question is how to prioritise both where (geographically) and to what sector, water should be allocated. Allocation coping strategies are one element of the adaptation to water scarcity.

### **3.7 ALLOCATION STRATEGIES**

Economists project that water in industrial use can create up to 40 more jobs than water in agriculture – yet there are significant questions regarding the sustainability of both the urban and rural economies if water is too rapidly moved from an agricultural sector to the industrial sector. This is, therefore, a complex question.

It is one that is further complicated by South Africa being a country that already has a significant number of inter-basin transfers. Water is pumped and piped from a number of catchments, and even foreign countries, to areas of high water demand and inadequate supplies, such as the Reef area. The Department of Water Affairs and Forestry will have to continue to make decisions regarding the future allocation of water through inter-basin transfers, taking into account a number of factors such as social and economic impacts. This raises important questions not only of how much water is actually available where, but also socio-economic questions of where it will be most beneficially used in the public interest.

It is also a question that is complicated by historical inequities in access to water in South Africa. If our allocation system allows water to be moved to certain uses purely on considerations of efficiency and effectiveness of use,

we face a real possibility of seeing a process of “resource capture” by those who have sufficient capital resources to make the technological adaptations necessary to use water more efficiently – for example, those farmers who are able to move from spray irrigation to micro-drip irrigation. In doing so, however, the potential exists for management of water scarcity to become a tool for the exclusion of the previously disadvantaged and the poor from access to water and from the right to use water for economic development and to escape the poverty trap.

The National Water Act specifically requires the consideration of redressing of the discrimination of the past, on the basis of both race and gender, in the allocation of water. This need has to be balanced by the need for improved efficiency of use as we try to manage our increasing water scarcity.

Multi criteria decision making methodology and the weighting of parameters that take into account socio-economic factors, water availability and requirements of the Act based on public participation will have to be determining factors in the allocation of water to different user sectors.

Much has been made of the potential for trading of water rights to achieve water use efficiency. Certainly, trading of water rights is one tool which will, to a certain extent, provide for reallocation of water both within and between sectors, where necessary. None the less, it is a limited tool. Water is not like a pair of shoes which can be shipped to any part of the world – if we are to manage our water resources effectively, the transfer of water from one user to another must be constrained by where it is abstracted and where it is returned (if it is returned). At the same time, increased water efficiency is crucial to reduce the pressure in already over allocated catchments.

The National Water Act does provide for the Department of Water Affairs and Forestry to auction water where an excess of water exists which can be allocated. This will enable a more appropriate price to be set for the water than might perhaps be set through purely administrative means and should result in high return, efficient use of the water. However, it is important to recognise that in many of the areas of economic development in South Africa, there is little if any water to allocate in such a manner. In many areas, for the foreseeable future, the only access that new users will have to a water allocation will be through buying it, or through water conservation making more water available for use.

The National Water Act enables the Department of Water Affairs and Forestry to manage water quality through both source directed and resource directed measures. On the source side, waste minimisation, re-use, and recycling remain key elements of the strategy for managing, reducing and controlling pollution. The drive must be towards cleaner technology, not only to better methods of disposal of effluent and waste.

On the resource side, the NWA requires all water resources to be classified. In terms of this classification (from relatively pristine to not so good) resource quality objectives must be set. These resource quality objectives must look at chemical and biological water quality, quantity of water, and protection of habitat and aquatic biota. The protection of habitat as part of the protection of our water resources is a particular innovation in terms of water quality protection. You will be hearing more about this during the conference.

### **3.8 IMPACT OF WATER QUALITY**

In allocating water, the impact in terms of water quality must be taken into account. This is necessary not only to protect our people, rivers, wetlands and streams, it is also necessary because certain users require water of a certain quality. A lower water quality can, for example force an industry to use greater amounts of water to compensate. There are a number of imperatives to make sure that our water quality does not deteriorate any further, but improves.

### **3.9 PUBLIC PARTICIPATION**

In order to avoid a situation of social instability developing as a result of water scarcity, the technological solutions and options that have been developed must be communicated to the people whom they will affect. To achieve the requisite social adaptability to manage in the face of physical water scarcity, we must ensure public participation in the process.

From the development of the National Water Resources Strategy, to the development of catchment management strategies and the establishment of catchment management agencies, stakeholders and interested and affected parties must be consulted and given opportunity to comment and give input.



This is a recognition that people lie at the heart of water resources management that the purpose of water resources management is to serve the people of South Africa. The challenge is how to make complicated technical information accessible to ordinary people, some of whom are illiterate, many of whom speak different languages from English, often perceived as the language that the majority will understand.

# SUMMARY OF CHAPTER ONE

## SECTION 1: OVERALL WATER SITUATION IN SOUTH AFRICA

South Africa is generally a water scarce country. It is estimated that, based on current usage trends, water demand will exceed availability by 2025. The continuing trend in industrialization and urbanization of the population is expected to place further pressure on the country's sources of water supply unless appropriate corrective action is taken.

For the year 2000, the total water requirements exceed available water in eleven of the nineteen WMAs, although a surplus exists for the country as a whole. In general, sufficient resources are available to meet all priority requirements for the next 25 years, provided they are well managed.

Estimates of water resource potential, that is yet undeveloped, show that the yield from surface water can be increased by about 5 600 million m<sup>3</sup> per year (see Table 5). Substantial volumes can also be made available through the increased re-use of return flows.

Numerous options for reconciling water requirements with availability are proposed.

## SECTION 2: THE SOUTH AFRICAN WATER SECTOR FRAMEWORK

The Department of Water Affairs is the custodian of South Africa's water and forestry resources. It is primarily responsible for the formulation and implementation of policy governing these two sectors. It also has the overriding responsibility for water services provided by local government.

The Draft White Paper on Water Services and its main impacts on the water sector are outlined. These include DWAF's new role in water services, the role of local government, and the interface between water services and water resources.

The Department structure, below the Ministry, consists of four main branches:

- Policy and regulation
- Operations
- Corporate services
- Financial management

The major pieces of legislation affecting water are outlined, as well as those Acts affecting water services in particular. The Water Services Chief Directorate of the Department has a crucial role to play in the domain of water supply to all South Africans. Water Services and water management institutions are also outlined in this section. The implementation of water service delivery through the various initiatives and agencies are also discussed.

### **SECTION 3: CHALLENGES FACING THE WATER SECTOR IN SOUTH AFRICA**

There are numerous challenges facing the water sector; the most significant of these are discussed under the following headings:

- Poverty
- Access to water
- Impact of the economy on water
- Re-use of water
- Water demand management
- Water “wars”
- Allocation strategies
- Impact of water quality
- Public participation