

## 13. South Africa

South Africa is the fourth largest country in Africa, with a surface area of 1,219,090 km<sup>2</sup> and an estimated population of 48 million. Average rainfall is 450 mm per year, but can vary significantly from less than 100 mm along the west coast to more than 1,000 mm on the east coast and along the escarpment. In the interior, seasonal rivers generate 27 percent of the runoff from 54 percent of the surface area, while in the west 24 percent of the surface area is drained by episodic rivers without any significant contribution to the runoff. The natural mean annual runoff (MAR) is about 49,000 million m<sup>3</sup> per year, of which only 27 percent is currently available as reliable yield. Due to the high temporal and spatial variation in rainfall, high evaporation and the location of water users, the remaining economic development potential is only 5.4 million km<sup>3</sup> per year (11 percent of MAR). Accordingly, per capita water availability is approximately 1,060 m<sup>3</sup> per year (based on MAR), of which the utilizable portion is only 300 m<sup>3</sup> per person per year. South Africa's existing water resource availability comprises 77 percent surface water, 9 percent groundwater and 14 percent re-use of return flows.

### Water and Ecosystems

South Africa is home to six world heritage sites, sixteen international Ramsar sites, twenty national parks and over 500 terrestrial reserves. However, ecosystems are under the threat of extensive land use, urbanisation, industrialisation and water resources development. Although over 50 percent of wetlands have been destroyed for land-use changes, such as a reduction of 40 percent of the area of Mfolozi Swamp (South Africa's largest fluvial plain), South Africa has successfully managed and protected numerous other wetland conservation areas – many with increased biodiversity thanks to environmental and natural resource management policies and practices. For example, the National Water Act of 1998 includes formal provisions for the protection of the aquatic ecosystems, including the classification of water resources, determination of the Reserve and setting of resource quality objectives. Consequently, no water use is licensed without first determining the Reserve (environmental requirement) and its possible impacts on the functioning of ecosystems.

### Water and settlements

South Africa is an urbanizing nation. Approximately 28 million people (59 percent of the overall population) live in more than 3,000 urban communities, including informal settlements. The nine largest cities are home to 16 million inhabitants (37 percent of the national population) and provide 50 percent of the nation's work force. These cities cover only two percent of the overall surface area of the country.

The rapid growth of informal urban settlements presents a major challenge. According to recent statistics, approximately 5 million people (28 percent of the urban population) live in such settlements without proper water services infrastructure. Some informal settlements are located along river reaches, which exposes them to waterborne diseases and makes them vulnerable to flooding. The fast growth of settlement development poses major challenges to municipalities and service providers. Extensive effort and funding is directed to water services, housing and integrated programmes to address urbanization and the creation of sustainable human settlements. This goes hand-in-hand with social development programmes and associated job creation.



**Map 14.14: Overview of the river basins of South Africa**

Source: Prepared for the World Water Assessment Programme by AFDEC, 2006.

The rural population (about 20 million people or 41 percent of the total population) also presents a major challenge for ensuring sustainable livelihoods. Although groundwater represents only about 9 percent of available water resources, 74 percent of South African rural communities are dependent entirely on groundwater, while another 14 percent depend partially on it.

South Africa has initiated a comprehensive basic water services programme to provide effective, affordable and equitable water services to all (see **Chapter 6**). South Africa successfully achieved the MDG target of halving the proportion of people lacking access to safe water by 2015 (reduced from 40 percent to 19 percent since 1994). The remaining challenge is to address the remaining 9 million people who still lack access to water supply, 64 percent of which live in rural settlements. In addition, 16 million people are still without acceptable basic sanitation facilities, 56 percent of which are rural inhabitants. The scattered nature of rural settlements presents major challenges for providing sustainable services.

Poverty is a profound socio-economic challenge in South Africa, which particularly affects female-headed households and rural inhabitants. Over 34 percent of the population live on less than US \$2 per day and 70 percent of the country's poorest households live in rural areas.

### Water and health

Nineteen percent of the population still lack access to safe water, and 33 percent lack basic sanitation services. Public institutions also suffer from a lack of access to safe water and sanitation services: 59 percent of all schools (over 16,000) and clinics (over 2,500) lack access to acceptable sanitation facilities, while 27 percent of all schools (over 7,500) and 48 percent of all clinics (over 2,000) lack access to safe water supply.

Water-related epidemics and diseases such as diarrhoea, cholera, dysentery, hepatitis and schistosomiasis occur in South Africa. In 2004, there were 2,780 cholera infections with 35 fatalities and 9,503 hepatitis A infections with 49 fatalities. Malaria is also a common disease; between 2000 and 2004, there were 77,854 reported incidences of malarial infection, 875 of which ended with fatality. Each year, some 2.5 million people fall ill with bilharzia (schistosomiasis), of whom about 10 percent are 'severely infected', although few die of the disease. Schistosomiasis infections are highest (up to 70 percent) amongst children living in lower-lying areas of Limpopo Province, Mpumalanga and KwaZulu-Natal. Infections of *shigella dysenteriae* vary significantly; there was a total of 894 cases recorded in 2004. Diarrhoea is a result of various types of bacteriological, viral and parasitic infections, affecting more than 3 million patients each year and causing up to 3 percent of annual deaths (over 15,000 deaths), of which not all are directly related to water. The high prevalence of HIV/AIDS is also a major concern (see **Chapter 6**). These diseases significantly affect the economic productivity and social activities of affected households.

The free basic water (FBW) programme to ensure access to effective water supply and sanitation services, in association with access to health facilities and services, plays a major role in addressing water-related diseases and improving the health and quality of life of all people. The South African Government is also promoting improved hygiene practices through national programmes, campaigns and education awareness at schools and in communities. Furthermore, the provision of free basic water services to the poor has become a national policy since 2000. This programme aims to ensure that poor households receive 6,000 litres of FBW per month. Beyond this basic allowance, users must pay for their consumption. The programme is progressively implemented by the Water Services Authorities, and over 76 percent of the population already receives access to FBW. Progress is also being made to ensure access to water supply and sanitation services at all schools and clinics.

### Water for food

South Africa's agricultural production is limited by the availability of natural resources (soil, climate and water), as only 15 percent of the

country is suited for conventional cultivation. Approximately 10 percent of the surface area is currently cultivated. In spite of the semi-arid climate, over 70 percent of crop production is rainfed, and less than 30 percent is produced with irrigation. In total, agriculture accounts for over 60 percent of total water utilization. Primary and processed agriculture currently contribute 15 percent to the GDP. Furthermore, agriculture is the main economic activity of rural areas and a major supplier of jobs, with almost 40 percent of poor households involved in agriculture for food or cash crops.

South Africa is self-sufficient in most major food crops and a main exporter of food to neighbouring states, largely through production on large commercial farms. In addition to this, approximately 1.6 million households (35 percent of rural households) depend on their own farming and food production abilities to meet their nutritional needs. The Government is giving increasing attention to social programmes in poverty-stricken areas to reduce the vulnerability of poor households. An example of this is the development of food plots and vegetable gardens for poor communities. Furthermore, institutional reform is underway to facilitate equitable access to water resources and representation in water management institutions.

### Water and energy

South Africa is the world's sixth largest producer of coal, which constitutes about 74 percent of the country's total energy consumption. Coal-fired thermal plants supply 93 percent of the country's total energy requirements. The energy sector has a considerable share in the economy as it employs about 240,000 people, which corresponds to approximately 1.5 percent of the economically active population and contributes 13 percent to the GDP. South Africa is the largest energy consumer on the continent, with an electricity consumption equivalent to two-thirds of the overall electricity use in Africa. To ensure the security of electricity supply, the energy sector receives a preferential allocation of water resources, while it only accounts for 2 percent of national water use.

Hydropower plants contribute only 0.4 percent to current electricity generation. This is mainly due to limiting factors like the quantity and variability of surface water. However, South Africa has prioritized hydropower development for managing electricity demand peaks and as a development potential within the Southern African Development Community (SADC). The SADC is a regional economic community that aims to combat poverty, ensure food security and promote industrial development through the integration of regional economies. Within the context of the SADC, the hydroelectric potential of the Zambezi and Congo rivers are explored in collaboration with Mozambique, Zimbabwe and Democratic Republic of Congo. Given the variability of surface water runoff, South Africa relies on dams and transfer schemes to ensure access to water in locations of high economic activity. In fact, the total storage capacity currently represents 66 percent of the total MAR.

To serve growing energy demands, South Africa is currently planning additional nuclear and thermal power generation schemes as well as some smaller solar and hydropower plants. In line with the national water resource strategy, water conservation measures have been introduced in the energy sector, resulting in savings of up to 40 percent of water consumption per energy unit generated.

### Water and industry

The industrial sector is the most prominent and the highest growing economic sector in South Africa. It generates 29 percent of the GDP and 54 percent (including mining) of all exports and employs over 25 percent of the total work force. Together, industry and mining account for 11 percent of the total water use in South Africa. Many industries and mines are located far from available water resources, which necessitates extensive water infrastructure developments to transfer water from other basins, sometimes in neighbouring countries.

These sectors are major impactors on water resources, and as a result, pollution control and water resource quality management receive high priority. Specific attention is given to effective use and conservation measures through various legislations such as the 1998 National Water Act.

### Water management and risk mitigation

In South Africa, water is governed by the National Water Act and the Water Services Act, supported by a dedicated Minister, a National Department of Water Affairs and Forestry, as well as various water institutions at various levels. Legislation in South Africa recognizes water as a national asset and a strategic resource for economic and social development. It also recognizes the need to protect the environment and ensure quality of life. IWRM has been adopted to achieve these goals. To date, four of the nineteen planned Catchment Management Agencies have been established. A further 170 municipalities have been given the responsibility to act as Water Services Authorities. This is supported by various infrastructure, finance, capacity-building and management programmes. Currently almost 3 percent of the national budget is allocated to water governance, and additional funds are provided for specific water-related programmes and infrastructure development.

Disasters like drought, floods, fires and epidemic outbreaks of diseases are common in South Africa. To manage these risks, South Africa has adopted a proactive planning and management approach. Through the national disaster management policy, institutional arrangements and early warning systems have been established.

Water resources and water services management is guided by a National Water Resource Strategy, catchment management strategies, integrated strategic perspectives and water services development plans. These are supported by institutional reform and the development of comprehensive regulatory frameworks. A key challenge is the development of appropriate

skills and the capacity-building of newly established water institutions. South Africa is also in the process of establishing a comprehensive integrated monitoring framework for water resources and water services. These various governance initiatives instill an effective, participative and sustainable water management culture in South Africa.

### Sharing water

There are four major transboundary river basins in South Africa, encompassing 65 percent of the country's surface area, 72 percent of the population and 40 percent of available water resources. These are the Limpopo (South Africa, Botswana, Zimbabwe, and Mozambique), the Komati (South Africa, Swaziland, and Mozambique), the Maputu/Usuthu (South Africa, Swaziland and Mozambique) and the Orange basins (South Africa, Lesotho and Namibia).

South Africa subscribes to IWRM and therefore promotes equitable allocation of water resources among uses and users at both the national and international level. Accordingly, South Africa has entered into nineteen international water agreements and treaties with its neighbouring countries, such as the revised protocol on shared water resources of the SADC.

South Africa is also sharing water across national river basins. The uneven distribution of water availability in South Africa in relation to the location of the country's economic growth centres necessitated the building of various inter-basin transfer infrastructure to facilitate optimal water utilization and sharing between economic sectors and stakeholders.

### Ensuring the knowledge base

South Africa's strong science base is well reflected in the water sector. However, the science and technology disciplines have a much skewed human resource base, with only 20 percent of the country's science, engineering and technology capacity constituted in the previously disadvantaged population groups. The knowledge base of the water sector, at present, reflects a similar disparity. For this purpose, various capacity-building programmes have been directed towards local authorities and water institutions. These initiatives include IWRM programmes, as well as other specific training, support and capacity-building programmes. This is further promoted by a participatory and cooperative governance approach, as well as various information, knowledge and advisory systems.

Water research plays a major role in establishing and maintaining the knowledge base. The Water Research Act of 1971 established the Water Research Commission (WRC), mandating it to coordinate and support water research, using funds from a dedicated Water Research Fund. Besides the direct impact on water resources, governance, management and development, these research projects also play a major role in capacity-building: more than 100 Masters and thirty PhD degrees were awarded in 2004.

Research is also carried out by universities and other institutions, as well as government-subsidized science councils, including the Council for Scientific and Industrial Research, the Agricultural Research Council and the Human Sciences Research Council.

### Conclusion

In South Africa, water scarcity is a limiting factor for development. The value of water is therefore high in all aspects of society, the economy and the environment.

South Africa is a country emerging from a history of political oppression to become a nation of democratic values for human dignity, equality and freedom. Poverty is the foremost social concern, and the government aims to address the needs of the poorest in society by ensuring access to basic services through dedicated programmes for infrastructure and free basic water services. The social value of water is founded in the desperate need of the 3.6 million people (8 percent of the population) who currently do not have access to any water supply infrastructure, and the 9 million people (39 percent of the population) who do not receive minimum basic water supply services.

Securing household food security is a common concern, as many families live a subsistence lifestyle and depend on rainfed irrigation to produce their own food. Although irrigation plays a strategic role in providing food security during dry years, water scarcity impedes irrigation on a wider scale.

The industrial and mining sectors are major contributors to the overall wealth of South Africa. To support economic growth and development, South Africa must reconcile the growing demands of the different uses with limited water availability, while ensuring the sustainability of ecosystems.

To address these challenges, South Africa has undertaken a comprehensive policy and legislative reform and is in the process of implementing these through various national programmes. This goes hand-in-hand with institutional reform and capacity-building programmes in order to ensure that IWRM is implemented and sustainable effective service delivery is ensured.

## 14. Sri Lanka

**Over a surface area of 65,600 km<sup>2</sup>, 19.5 million people live in Sri Lanka. Water bodies, a considerable portion of which are man-made, cover about 4 percent of the land. The terrain of the island is mostly made up of coastal plains, with mountains rising only in the south central part.**

Sri Lanka has more than 100 water basins, varying from 10 km<sup>2</sup> to over 10,000 km<sup>2</sup> in size. The Ruhuna Basins,<sup>10</sup> which are located at the southern part of the island, were featured in WWDR1 (see **WWDR1 case study**).

The climate of Sri Lanka is tropical and heavily influenced by monsoons that bring rain throughout the year. The mean annual rainfall volume is approximately 120 km<sup>3</sup>. Rainfall totals range from under 1,000 mm to over 5,000 mm. Sri Lanka's groundwater resources are considered minor compared to its surface water resources. The estimated groundwater potential in Sri Lanka is 7.8 km<sup>3</sup> per annum and is widely used for domestic, small-scale irrigation, industrial and other uses. However, in recent years, due to increased irrigation and population growth, both shallow and deep aquifers have been subject to over-extraction. Consequently, the drying up of domestic wells during dry periods has become more common.

### Water and ecosystems

There is a rich diversity of ecosystems in Sri Lanka, including wetlands, natural forests and marine and coastal ecosystems. Sri Lanka is considered one of the world's twenty-five 'Biodiversity Hotspots' (i.e. very rich in biodiversity). Overall, there are three Biosphere reserves, one World Heritage site, three Ramsar sites (see **Chapters 5 and 12**) and

forty-one wetland sites included in the Asian Wetland Directory. Coastal ecosystems are diverse, but their fragmentation, in addition to that of forests, is extremely high (UN, 2002). In 1999, the Government imposed a ban on logging in all natural forests in order to curb deforestation.

Sixteen of Sri Lanka's coastal lagoons are classified as threatened and constitute nearly half of the country's threatened wetlands. Environmental degradation of the coastal zone is a major hazard faced by Sri Lanka as an island state. During the last two decades, there has been increasing pressure for development in the coastal zone, particularly for tourism and recreational purposes, near shore fisheries, fish farming, industrial development and housing. Communities have exploited the use of natural resources, such as sand and coral, on a commercial basis. Development pressures have also led to the reclamation of estuarial, lagoon and marsh waters and the unrestricted disposal of untreated sewage, leading to major pollution problems. The main threat to natural ecosystems, however, is population growth and migration, reducing the available habitat for ecosystems to thrive. Some other threats to the island's biodiversity are natural disasters, soil erosion, sedimentation and large-scale sand mining.

10. See [www.unesco.org/water/wwap/case\\_studies/ruhuna\\_basins/](http://www.unesco.org/water/wwap/case_studies/ruhuna_basins/) for more information.