In terms of its biological heritage, South Africa is recognised as one of the richest nations in the world.

The Department of Environmental Affairs and Tourism's mission is to lead the sustainable development of South Africa's environment by:

- conserving the country's natural resources
- protecting and improving the quality and safety of the environment
- promoting a global sustainable-development agenda.

The provincial conservation agencies are major role-players, and independent statutory organisations such as South African National Parks (SANParks) and the South African National Biodiversity Institute (Sanbi) are valuable partners in the country's total conservation effort.

South Africa has made significant progress in the area of environmental management in the last decade. Laws and strategies have been developed that focus on key environmental areas such as biodiversity, air quality, protected areas, urban and rural development, and waste and disaster management.

Improved environmental conditions include certain fish stocks, which have recovered due to good management measures and a slowing of habitat loss in some areas of the country.

Programmes to rehabilitate ecosystems while creating jobs have received increased budgets.

Policy and legislation

The National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004), provides a regulatory framework to protect South Africa's valuable species, ecosystems and its biological wealth. It implements the *White Paper on the Conservation and Sustainable Use of South Africa's Biological Diversity*, and multilateral agreements such as the Convention on Biological Diversity (CBD).

South Africa is a signatory to the CBD, which provides the framework, norms and standards for the conservation, sustainable use and equitable benefit-sharing of South Africa's biological resources.

The Act facilitated the transformation of the National Botanical Institute (NBI) into Sanbi.

The National Environmental Management: Protected Areas Act, 2003 (Act 57 of 2003), provides for the protection and conservation of ecologically viable areas that are representative of South Africa's biological diversity, its natural landscapes and seascapes, and the management thereof. The Act envisages a national register of protected areas, with a simplified classification system of special nature reserves, national parks, nature reserves and protected environments.

It also introduces the concept of biological-diversity protection and ecosystem management. Biodiversity, conservation and ecosystem management are noted as important aims in policy and legislation that govern marine and coastal resources, fresh water and natural forests.

The Act also proposes a new system of protected areas, linking various kinds of protected environments to replace the existing fragmented system.

In addition, the Act enables the Minister of Environmental Affairs and Tourism to acquire private land by purchasing land rights for the creation of protected areas.

Based on experience with biosphere reserves, and informed by the new bioregional approach to conservation (linking the protected-area network along mountains, rivers, wetlands, the coastline and other areas of natural vegetation), the Act will result in an interlocking system of protected areas that explicitly encourages the inclusion of private land.

It recognises that people are the custodians of the land, that they need to be involved in the management of the protected land and that they should benefit from it.

The Act caters for concurrent competence in the management of protected land. For example, an area with national-park status can now be managed by another agency, for example, a provincial parks authority. Steps have been taken to ensure that standards are upheld.

Regulations in terms of the National Environmental Management: Protected Areas Amendment Act, 2004 (Act 31 of 2004), provide for the proper administration of specific nature reserves, national parks and world heritage sites.

South Africa is one of only two countries in the world to have promulgated legislation specifically related to the World Heritage Convention (the other being Australia). The country's World Heritage Convention Act, 1999 (Act 49 of 1999), stipulates that all world

heritage sites must have an integrated management plan in place to ensure cultural and environmental protection and sustainable development of the site.

In February 2007, the Minister of Environmental Affairs and Tourism, Mr Marthinus van Schalkwyk, announced regulations pertaining to threatened and protected species.

The regulations were expected to come into effect on 1 February 2008.

The regulations will introduce a uniform national system for the registration of captive breeding operations, commercial exhibition facilities, game farms, nurseries, scientific institutions, sanctuaries and rehabilitation facilities.

These institutions will be required to meet strict criteria. For the first time, provision will be made for the recognition of hunting organisations, and the application of codes of ethical conduct and good practice.

The introduction of game-farm hunting and nursery-possession permits is aimed at streamlining the permit-issuing process. It will also compel permit holders to provide critical information to the authorities, which will assist in assessing the status of biodiversity in the country.

To meet South Africa's commitments to the Convention on International Trade in Endangered Species (Cites), a new national scientific authority will enable uniform implementation and provide access to scientific information beyond just Cites species.

The regulations specifically prohibit hunting large predators and rhinoceros that are "put and take" animals, in other words a captive-bred animal that is released on a property for the purpose of being hunted within 24 months.

The regulations include prohibitions and restrictions on certain activities and methods of hunting. For example, hunting thick-skinned animals and large predators with a bow and arrow will be prohibited, and hunting from vehicles will no longer be allowed.

State of the environment

South Africa's second *National State of Environment Report*, released in June 2007, includes a number of new components, namely a section on human vulnerability to environmental change, alternative environmental futures and recommendations for action.

Specialist studies focusing on a number of themes include atmosphere and climate, land, waste, biodiversity, inland water, marine and coastal ecosystems, human settlements, energy, environmental governance, and human vulnerability to environmental change.

While the report outlined a general decline in the state of the environment, government is confident that its response strategies will continue to ensure that South Africa is a leader in sound management and sustainable resource use.

World Summit on Sustainable Development (WSSD)

Johannesburg hosted the WSSD in September 2002. The agreements reached in Johannesburg are a guide to action that will take forward the United Nations (UN) Millennium Summit Declaration's goal of halving world poverty by 2015, and will incorporate decisions taken by world bodies since the Rio Earth Summit in 1992.

Among the victories of the WSSD was the launch of over 300 partnerships, including 32 energy initiatives, 21 water programmes and 32 programmes for biodiversity and ecosystem management.

The biggest success was getting the world to turn the UN Millennium Declaration into a concrete set of programmes and to mobilise funds for these programmes. The WSSD focused on the most marginalised sectors of society, including women, the youth, indigenous people and people with disabilities. The Implementation Plan includes programmes to deliver water, energy, healthcare, agricultural development and a better environment for the world's poor. It also incorporates targets for the reduction of poverty and the protection of the environment.

Targets set at the summit will have an enormous impact, including the following:

- the number of people without basic sanitation and access to safe drinking water will be halved by 2015
- biodiversity loss is to be reversed by 2010, and collapsed fish stocks restored by 2015
- chemicals with a detrimental health impact will be phased out by 2020
- energy services will be extended to 35% of African households over the next 10 years.

National Strategy for Sustainable Development (NSSD)

South Africa is committed to meeting the agreements reached at the WSSD, including the development of the NSSD.

The NSSD is intended to be a powerful tool for addressing important issues such as water quality and quantity, climate change, waste management, soil loss and pollution, food production and

strategic biodiversity management, while attending to development priorities associated with tackling poverty and basic human needs.

Biological diversity

South Africa enjoys the third-highest level of biodiversity in the world. The country's rich natural heritage is vast and staggering in its proportions.

Although the country covers only 2% of the world's land area, nearly 10% of the world's plants and 7% of its reptiles, birds and mammals are found here.

The three internationally recognised biodiversity hotspots in South Africa are the Cape Floral Region in the south, the Succulent Karoo that the country shares with Namibia, and that of Maputoland-Pondoland in the east, which extends into Swaziland and Mozambique.

South Africa's marine life is similarly diverse, partly as a result of the extreme contrast between the water masses on the east and west coasts. Three water masses – the cold Benguela current, the warm Agulhas current, and oceanic water – make the region one of the most oceanographically heterogeneous in the world. According to the *White Paper on the Conservation and Sustainable Use of South Africa's Biological Diversity*, over 10 000 plant and animal species – almost 15% of the coastal species known worldwide – are found in South African waters, with about 12% of these occurring nowhere else.

World Wetlands Day: 2 February
National Water Week: 19 to 25 March
Earth Day: 20 March
World Water Day: 22 March
World Meteorological Day: 23 March
World Environment Day: 5 June
World Oceans Day: 8 June
World Desertification Day: 17 June
National Arbour Week: 1 to 7 September
International Day for the Protection of the Ozone Layer: 16 September
World Tourism Day: 27 September
World Habitat Day: 4 October
National Marine Day: 20 October.

The country's natural heritage is best described according to a systematic classification of regions, or biomes. A biome is a broad ecological unit representing a major life zone, which extends over a large area, and contains relatively uniform plant and animal life closely connected with environmental conditions, especially climate.

The White Paper states that South Africa is one of six countries in the world with an entire plant kingdom within its national confines. The Cape Floral Kingdom has the highest-recorded species diversity for any similar-sized temperate or tropical region in the world.

Other biomes in the country are also of global conservation significance. For example, one-third of the world's succulent plant species are found in South Africa.

There are eight major terrestrial biomes, or habitat types, in South Africa, which can, in turn, be divided into 70 veld types.

The degree to which each of these biomes is threatened varies, depending on the fertility of the soil, the economic value derived from use of the area, human population pressures and the extent to which the biome is conserved in protected areas.

Savanna biome

This biome is an area of mixed grassland and trees, and is generally known as bushveld.

In the Northern Cape and Kalahari sections of this biome, the most distinctive trees are the camel thorn *(Acacia erioloba)* and the camphor bush *(Tarchonanthus camphoratus)*. In Limpopo, the portly baobab *(Adansonia digitata)* and the candelabra tree *(Euphorbia ingens)* dominate. The central bushveld is home to species such as the knob thorn (*Acacia nigrescens)*, bushwillow *(Combretum spp.)*, monkey thorn *(Acacia galpinii)*, mopani *(Colophospermum mopane)* and wild fig *(Ficus spp.)*. In the valley bushveld of the south, euphorbias and spekboom trees *(Portulacaria afra)* dominate.

Abundant wild fruit trees provide food for many birds and animals in the savanna biome. Grey loeries, hornbills, shrikes, flycatchers and rollers are birds typical of the northern regions. The subtropical and coastal areas are home to Knysna loeries, purple-crested loeries and green pigeons.

Raptors occur throughout the biome. The larger mammals include lion, leopard, cheetah, elephant, buffalo, zebra, rhinoceros, giraffe, kudu, oryx, waterbuck, hippopotamus and many others.

About 8,5% of the biome is protected. The Kruger National Park, Kgalagadi Transfrontier Park, Hluhluwe-Umfolozi Park, Isimangaliso Wetlands Park (formerly Greater St Lucia Wetlands Park) and other reserves are located in the savanna biome.

Nama-Karoo biome

This biome includes the Namaland area of Namibia, and the Karoo area of South Africa.

Because of low rainfall, rivers are non-perennial. Cold and frost in winter and high temperatures in summer demand special adaptations from plants. The vegetation of this biome is mainly low shrubland and grass, with trees limited to water courses.

The bat-eared fox, black-backed jackal, ostrich, suricate and ground squirrel are typical of the area.

Only 1% of the Nama-Karoo biome falls within officially protected areas, of which the Karoo and Augrabies national parks are the largest.

Overgrazing and easily eroded soil surfaces are causing this semi-desert to creep slowly in on the neighbouring savanna and grassland biomes.

Grassland biome

This biome is a summer-rainfall area with heavy thunderstorms and hail in summer, and frost in winter.

A number of perennial rivers such as the Orange, Vaal, Pongola, Kei and Umzimvubu originate in, and flow through, the area.

Trees are scarce and are found mainly on hills and along riverbeds.

Karee (*Rhus lancea*), wild currant (*Rhus pyroides*), white stinkwood (*Celtis africana*) and several acacia species are the most common.

The grassland biome has the third-largest number of indigenous plant species in the country.

Eight mammal species endemic to South Africa occur in a wild state in this biome. Two of these, namely the black wildebeest and the blesbok, occur mainly in the grassland biome.

The area is internationally recognised as an area of high species endemicity as far as birds are concerned. Birds commonly found in the area include the black korhaan, blue crane, guinea-fowl and other grassland birds.

Only 1,1% of the grassland biome is officially protected. The wilderness areas of the KwaZulu-Natal Drakensberg are the most significant.

Succulent Karoo biome

One of the natural wonders of South Africa is the annual blossoming of the Namaqualand wild flowers (mainly of the family *Asteraceae*), which transforms the semi-desert of the Northern Cape into a fairyland. After rain, the drab landscape is suddenly covered from horizon to horizon with a multicoloured carpet (from August to October, depending on the rainfall).

This is a winter-rainfall area with extremely dry and hot summers. Succulents with thick, fleshy leaves are plentiful. Most trees have white trunks to reflect the heat.

The quiver tree (*Aloe dichotoma*) and the human-like elephant's trunk (*Pachypodium namaquanum*) are prominent in the Richtersveld. Grass is scarce.

The animal life is similar to that of neighbouring biomes (fynbos and Nama-Karoo).

The Richtersveld, Tankwa Karoo and Namaqua national parks have improved the conservation status of this biome considerably.

Fynbos biome

The fynbos biome is one of the six accepted floral kingdoms of the world. This region covers only 0,04% of the land surface of the globe.

Fynbos is found mainly in the Western Cape. This is a winter-rainfall area and the fynbos vegetation is similar to that of mediterranean regions.

Fynbos is the name given to a group of evergreen plants with small, hard leaves (such as those in the Erica family). It is made up mainly of the protea, heathers and restio, and incorporates a diversity of plant species (more than 8 500 kinds, over 6 000 of which are endemic).

The fynbos biome is famous for the protea, for which South Africa is renowned. The biome also

The Department of Environmental Affairs and Tourism, in partnership with its stakeholders, observed National Environment Week, from 4 to 8 June 2007, with a series of environmental-awareness activities. These included the global celebration of World Environment Day on 5 June.

World Environment Day was established by the United Nations (UN) General Assembly in 1972, making it the 35th anniversary to mark the opening of the Stockholm Conference on the Human Environment. This ground-breaking conference gave rise to the UN Environment Programme, which has provided a crucial platform for the expression of environmental concerns internationally.

The event was celebrated under two overarching themes of climate change, *Today's Actions – Shaping Tomorrow's Environment* and *Strengthening the Partnership for Shared Growth Through Environment and Tourism.*

contains flowering plants, now regarded as garden plants, such as freesia, tritonia, sparaxis and many others.

Protected areas cover 13,6% of the fynbos biome and include the Table Mountain and Agulhas national parks.

This biome is not very rich in bird and mammal life, but does include the endemic Cape grysbok, the geometric tortoise, Cape sugarbird and the protea seed-eater. The mountains are the habitat of the leopard, baboon, honey-badger, caracal, rhebuck and several types of eagle and dassies.

Forest biome

South Africa's only significant forests are those of Knysna and Tsitsikamma in the Western and Eastern Cape, respectively.

Other reasonably large forest patches that are officially protected are in the high-rainfall areas of the eastern escarpment, and on the eastern seaboard. Forest giants such as yellowwood (*Podocarpus spp.*), ironwood (*Olea capensis*) and lemonwood (*Xymalos monospora*) dominate.

The indigenous forests are a magical world of ferns, lichens, and colourful forest birds such as the Knysna loerie, the endangered Cape parrot and the rameron pigeon. Mammals include the endangered samango monkey, bushpig, bushbuck and the delicate blue duiker.

Thicket biome

Subtropical thicket ranges from closed shrubland to low forest, dominated by evergreen succulent trees, shrubs and vines.

It is often impenetrable and has little herbaceous cover. Roughly 20% of the species in the thicket biome are endemic to it.

Desert biome

True desert is found under very harsh environmental conditions, which are even more extreme than those found in the succulent Karoo and the Nama-Karoo biomes. The climate is characterised by summer rainfall, but also by high levels of summer aridity. Rainfall is highly variable from year to year. Desert is found mostly in Namibia, although it does occur in South Africa in the lower Orange River Valley.

The vegetation of the desert biome is characterised by the dominance of annual plants (often annual grasses). This means that after a rare season of abundant rain, the desert plains can be covered with a sea of short annual grass, whereas in drier years, the plains appear bare with the annual plants persisting in the form of seeds.

Perennial plants are usually encountered in specialised habitats associated with local concentrations of water. Common examples of such habitats are broad drainage lines or washes. Nearer the coast, the role of coastal fog also governs the distribution of certain species commonly associated with the desert.

The desert biome incorporates an abundant insect fauna, which includes many tenebrionid beetles, some of which can use fog water. There are also various vertebrates, including reptiles, springbok, ostrich, gemsbok, snakes and geckos.

Some areas in the desert biome are formally protected in the Richtersveld National Park.

Preserving biodiversity

Biodiversity plays a crucial role in sustainable development and poverty eradication. Fundamental changes to the legislative, policy and institutional framework for natural resource management have resulted in a shift in focus from an elitist conservation approach to a management approach based on South Africa's recognition of the contribution of biological resources to food security, science, economy, cultural integrity and well-being.

The country's conservation areas contribute to job creation and socio-economic upliftment, and continue to serve as a foundation of the tourism industry.

South Africa is a very popular tourist destination. The main attractions are nature-based tourism facilities such as national parks and private game reserves. There are some 9 000 privately owned game ranches in South Africa, covering about 13% of the country's total land area. The contribution of these areas towards maintaining South Africa's unique biodiversity is incalculable.

The publication in 2006 of the *National Spatial Biodiversity Assessment* by the Department of Environmental Affairs and Tourism and Sanbi, revealed that 34% of South Africa's ecosystems are

threatened, with 5% critically endangered; while 82% of the 120 main rivers are threatened and 44% critically endangered. Of the 13 groups of estuarine biodiversity, three are in critical danger and 12% of marine biozones are under serious threat.

Because of the geographic spread and diversity of South Africa's plant and animal species – up to 80% of significant biodiversity lies outside existing protected areas – a traditional approach to conservation is inadequate. Biodiversity priorities have to be integrated with all policies, plans and programmes.

Minister van Schalkwyk launched South Africa's National Biodiversity Strategy and Action Plan (NBSAP) in June 2006. It aims to guide conservation and the management of biodiversity to ensure sustainable and equitable benefits for all communities.

The NBSAP highlights five strategic objectives, such as the need for a network of protected areas that conserve a sample of all South Africa's biodiversity; specifies how these are to be realised; and sets five- and 15-year targets for each.

The NBSAP also provides for the entrenchment of biodiversity concerns in production sectors, such as mining and forestry, by focusing on the inclusion of biodiversity priorities in guidelines and codes of best practice, and on measures to encourage sustainable production practices.

The NBSAP informs the creation, in law, of the National Biodiversity Framework to ensure an integrated, co-ordinated and consistent approach to biodiversity management by organs of state in all spheres of government, non-governmental organisations (NGOs), the private sector, local communities, other stakeholders and the public.

South African Biodiversity Information Facility (Sabif)

The Global Biodiversity Information Facility (GBIF) is a mega-science facility which was established in 2001, through collaborations among countries and international organisations. It aims to make the world's biodiversity data freely and openly available on the Internet.

South Africa became a voting participant of the GBIF in April 2003, thereby committing itself to establishing national nodes that are linked to the GBIF.

Launched in June 2005, Sabif represents a partnership of more than four South African data-providers, including other role-players such as the Council for Scientific and Industrial Research, South African Integrated Spatial Information System, South African Society for Systematic Biology, Endangered Wildlife Trust, Biobank South Africa or Wildlife Biodiversity Resources, the Biomap initiative and museums.

Through Sabif, South Africa will be able to respond to pertinent biodiversity challenges through innovative applications of information technology.

Sabif intends to create an enabling platform for end users to discover and put to use vast quantities of global biodiversity data to:

- advance scientific research in many disciplines
- promote technological and sustainable development
- facilitate the equitable sharing of the benefits of biodiversity
- enhance the quality of life of members of society.

South African Biosystematics Initiative (Sabi)

Sabi, which was established in 2002, aims to take a leading role in the application of innovative approaches to systematics and taxonomy as fundamental sciences underpinning biological research.

In this way, it plans to unlock the full potential of South Africa's biological and human resources through the enhanced practice of biosystematic science, and to use modern technology to build on an existing rich historical scientific legacy, including indigenous knowledge systems.

Some of Sabi's primary objectives include establishing a framework and strategy to:

- address the diminishing national capacity in biological systematics and taxonomy
- provide leadership and co-ordination to promote innovative research in the field of biosystematics
- empower South African biosystematics to employ and develop modern scientific technologies and approaches regarding the documentation and use of biological resources
- enhance the ability of South African biosystematics to contribute to the National System of Innovation and the information society, and thus respond to national priorities in agriculture, health, sustainable development and conservation.

South African Environmental Observation Network (SAEON)

The SAEON is a facility of the National Research Foundation (NRF). Its main aim is to establish and maintain environmental observatories, field

stations and sites, linked by an information-management network, to serve as research and education platforms for the long-term study of ecosystems. It provides for incremental advances in understanding ecosystems and the ability to detect, predict and react to environmental changes.

The SAEON satisfies the need for public-decision support by generating long-term information relevant to the sustainable management of natural resources and habitats over a spectrum of eco-regions and land uses, ranging from pristine to urbanisation-transformed landscapes.

Wildlife Biodiversity Resources or Biobank South Africa

With the growing global market in biomaterial and biodiversity informatics, developing countries such as South Africa face the enormous challenge of setting up systems for governing access to biodiversity and the sustainable use of their biodiversity heritage.

The biosciences field is recognised as the driving force behind the next revolutionary wave of scientific and technological advancement.

Biobank facilities (genebanks) are increasingly becoming a key strategic research infrastructure for countries worldwide. Their importance in the conservation and sustainable use of biodiversity has, among other things, been emphasised in the Consolidated Plan of Action for Science and Technology.

This has led to the Department of Environmental Affairs and Tourism collaborating with Wildlife Biodiversity Resources or Biobank South Africa to help facilitate, through its member organisations, an integrated and co-ordinated drive to access, collect, enhance and bank a representative range of biomaterial from key South African and African wildlife and indigenous livestock species for conservation, research and biotechnology development purposes.

This facility also provides general custodianship to South Africa's wildlife biomaterial and/or genetic resources.

Genebanks

The Department of Science and Technology and the Agricultural Research Council (ARC) support the maintenance, management and development of national public assets for the benefit of the broader science community.

They are national repositories of genetic information and terrestrial data related to the environment, and include the specimens of and facilities that house all insects, support arachnids, nematodes, fungi and various other genebanks.

South Africa has international obligations that compel it to keep reference collections of all agricultural specimens regarding the import and export of agricultural produce.

The national collections and genebanks house these reference collections and make an important contribution to scientific studies, biodiversity replenishment, sustainable development and production, food security and invader-pest identification.

South African National Biodiversity Institute

Sanbi was established on 1 September 2004 with the renaming of the NBI in terms of the National Environmental Management: Biodiversity Act, 2004.

Sanbi, with its head office based at the Pretoria National Botanical Garden, is an autonomous state-aided institute whose vision is to be the leading institution in biodiversity science in Africa, facilitating conservation and the sustainable development of living resources and human well-being. In addition to new biodiversity-related initiatives linked to the Act, traditional activities undertaken by Sanbi include:

- collecting, displaying and cultivating plants indigenous to South Africa
- undertaking and promoting research into indigenous plants and related matters
- studying, researching and cultivating threatened plant species
- promoting the economic potential of indigenous plants
- running environmental-education programmes.

Sanbi manages nine national botanical gardens in five of South Africa's nine provinces. The gardens collectively attract over 1,25 million visitors a year, are signatories to the International Agenda for Botanic Gardens in Conservation, and are founding members of the African Botanic Gardens Network.

The largest garden is Kirstenbosch, situated on the eastern slopes of Table Mountain in Cape Town. It displays 5 300 indigenous plant species, and was voted one of the top-seven botanical gardens in the world at the International Botanical Congress held at Missouri Botanical Garden, United States of America, in 1999.

Kirstenbosch National Botanical Garden, as part of the Table Mountain National Park (TMNP), was included in the Cape Floral Region World Heritage Site in 2004, becoming the first botanical garden in the world to be included within a natural world heritage site.

Kirstenbosch receives more than 750 000 visitors annually. The Kirstenbosch National Botanical Garden houses the Kirstenbosch Research Centre, the Rufford Maurice Laing Centre for Biodiversity Conservation, Gold Fields Environmental Education Centre, the Botanical Society Conservatory, two restaurants, a conference venue, gift shops, a coffee bar, concert venues, sculpture exhibits and the Centre for Home Gardening, which includes an indigenous plant retail nursery.

The other gardens in the national network are the Karoo Desert in Worcester, Harold Porter in Betty's Bay, Free State in Bloemfontein, KwaZulu-Natal in Pietermaritzburg, Lowveld in Nelspruit, Walter Sisulu in Roodepoort/Mogale City, and the Pretoria National Botanical Garden.

The Pretoria National Botanical Garden houses the National Herbarium of South Africa, the largest herbarium in the southern hemisphere.

The Harold Porter National Botanical Garden boasts Disa uniflora in its natural habitat (flowering from mid-December to the end of January), and South Africa's national flower, the king protea (*Protea cynaroides*).

The Walter Sisulu National Botanical Garden accommodates more than 600 naturally occurring plant species, over 230 bird species, and a number of reptiles and small mammals. These include jackal and antelope, which occur in the natural areas of the garden.

This garden receives some 180 000 visitors annually and is the fastest-growing of the Sanbi-managed gardens. It covers over 275 hectares (ha) and consists of landscaped and natural areas. All the garden's plants are indigenous to Southern Africa.

South Africa's ninth national botanical garden, the Nieuwoudtville National Botanical Garden, was unveiled in August 2007.

The garden covers 6 300 ha of land on the Bokkeveld Plateau, which is famous for its range and density of bulbous plants, to the extent that Niewoudtville is often referred to as the "bulb of the world".

Some 40% of the local flora consist of bulbs that create spectacular displays every autumn and spring. The garden also incorporates large natural patches of renosterveld fynbos and succulent Karoo vegetation. Almost a third of the species endemic to the Bokkeveld Plateau are threatened with extinction.

Sanbi operates environmental-education programmes within its national botanical gardens, and outreach greening programmes focused on promoting indigenous gardening at disadvantaged schools in surrounding areas.

Herbaria and taxonomic research

Sanbi researches the evolution, diversity, distribution and relationships of southern Africa's 24 000 species of plants, based on the Sanbi collection of over 1,8 million specimens in its three herbaria. There are also regional herbaria in Durban (KwaZulu-Natal Herbarium) and at the Kirstenbosch Research Centre (Compton Herbarium).

Recent products of plant taxonomic research within Sanbi have included a national plant checklist and the first-ever flowering plant checklist for sub-Saharan Africa. There are 50 136 plant taxa recorded for sub-Saharan Africa and some 19 581 indigenous plant species recorded for South Africa. South Africa, with its 11 700 endemic plant species, has the richest temperate flora in the world.

Biodiversity research

In addition to herbarium and taxonomic research, the Kirstenbosch Research Centre in Cape Town is a centre of excellence for biodiversity research.

The research programme focuses on the impact of climate change, invasive alien species and land-use on biodiversity, and the development of conservation plans for threatened ecosystems and species.

The centre has developed a new vegetation map for South Africa and maintains the Protea Atlas Database, one of the most comprehensive plant databases in the world.

The Leslie Hill Molecular Systematics Laboratory is one of the facilities at the Kirstenbosch Research Centre. A DNA bank has been established at the laboratory, in collaboration with the Royal Botanic Gardens, Kew, in the United Kingdom (UK).

The objectives of the bank, which is funded by the UK-based Darwin Initiative, are to archive the

DNA of at least one species of all 2 200 genera of South Africa's flowering plants, to train South African researchers and students in high-profile biotechnologies and to produce a tree of life of South African plants.

Millennium Seed Bank

The Millennium Seed Bank Project in South Africa is part of a 10-year international programme that aims to collect and conserve 10% of the world's seed-bearing plant species (some 24 000 species) in the Millennium Seed Bank facility of the Royal Botanic Gardens in Kew by 2010.

Sanbi joined the Millennium Seed Bank International Programme in 2000. The South African collaboration aims to contribute by collecting the seed of about 2 500 plant species indigenous to the region for storage in this long-term conservation facility.

Greening of the Nation

The Greening of the Nation Project, managed by Sanbi, is a new government-funded programme that has been initiated in various provinces for community and school greening projects. Its activities include the greening of towns (road islands and entrances), schools, crèches, day-care centres, community parks, cemeteries, police stations, and cultural villages, and the development of community nurseries.

Many projects include the development of indigenous and vegetable gardens. The programme works closely with Food and Trees for Africa, the first national non-governmental, non-profit, greening organisation in South Africa, established in 1990.

Working for Wetlands

Sanbi also manages the Working for Wetlands Programme, with its offices based at the Pretoria National Botanical Garden.

Biodiversity planning and assessment

Sanbi has assessed the contribution of municipal nature reserves to meeting national biodiversity targets, which highlighted the crucial role that municipal nature reserves play in conserving biodiversity, and the need for supporting the development of municipal capacity to manage them effectively.

Sanbi supported the initiation of provincial biodiversity plans in the Eastern Cape and North West. These plans will form the basis for publishing bioregional plans in terms of the Biodiversity Act, 2004. North West and the Eastern Cape join Gauteng, KwaZulu-Natal and Mpumalanga as provinces that have systematic spatial biodiversity plans that identify priority areas for biodiversity, using the best available science.

Policy support

In 2006/07, Sanbi provided support to the Department of Environmental Affairs and Tourism on policy development and implementation, including developing the National Biodiversity Framework, preparing for the listing of threatened or protected ecosystems in terms of the Biodiversity Act, 2004 and developing guidelines for publishing bioregional plans in terms of the Act.

New tools in the Biodiversity Act, 2004, such as listed ecosystems and published bioregional plans, will enable integrated management of priority terrestrial and aquatic ecosystems, many of which fall outside the protected area network, and will help to streamline environmental authorisations, ensuring outcomes that support both conservation and development.

Bioregional programmes

Sanbi co-ordinates a suite of bioregional programmes that focus on partnership projects to mainstream biodiversity in socio-economic development.

The most recent addition to the suite is the Marine Biodiversity Programme, initiated in partnership with the World Wide Fund for Nature South Africa (WWF-SA) and Marine and Coastal Management. The programme focuses on facilitating the establishment of a network of offshore marine protected areas (MPAs) in South Africa's waters, and engaging with the fisheries and mining sector.

The Grasslands Programme focuses on mainstreaming biodiversity in production sectors. Demonstration projects underway include rehabilitating river ecosystems in the Free State, wetland mitigation banking with the coal-mining

industry in Mpumalanga, securing priority biodiversity sites within urban areas in Gauteng, biodiversity stewardship on farms in the Wakkerstroom area in Mpumalanga, working with the forestry industry to secure 35 000 ha of high biodiversity priority forestry-owned land and ensuring that expansion of small-grower plantation forestry is underpinned by biodiversity considerations.

The Succulent Karoo Ecosystem Programme (Skep) has established innovative partnerships with De Beers on the Namaqualand coast and with Anglo American Base Metals as part of the Bushmanland Conservation Initiative in the Northern Cape, securing mine-owned land in conservation agreements that contribute to national biodiversity targets.

In partnership with the Development Bank of Southern Africa (DBSA), Conservation International and the Critical Ecosystem Partnership Fund, Skep has established Skeppies, the first-ever small grant fund enabling synergy between conservation and local economic development activities.

The Subtropical Thicket Ecosystem Programme (Step) focuses on integrating maps of biodiversity priorities into municipal planning and land-use decision-making in the Eastern Cape, including publishing a fully revised Step handbook and mapbook.

Step has initiated four biodiversity-related integrated development plan (IDP) projects in municipalities in the Fish River valley.

Cape Action for People and the Environment (Cape) closed off its US$6-million investment from the Critical Ecosystem Partnership Fund, having funded 65 civil society-led projects in the Cape Floral Region over the five-year investment period. Cape continues to roll out the Biodiversity Conservation and Sustainable Development Project with an investment of US$11 million from the Global Environment Facility (GEF), with a key focus on strengthening co-operative governance for improved biodiversity management in this global biodiversity hotspot.

Sanbi gave extensive input into the development of the Woolworths Biodiversity Strategy, through the Cape, Skep, Step and Grasslands programmes.

Assessing and monitoring indigenous fauna and flaura

Since 2004, Sanbi has responded to its new mandate through the initiation of a suite of projects that will assess and monitor the status of South Africa's indigenous fauna. As part of its Threatened Species Programme, Sanbi co-ordinates several atlas projects, which capture records of species occurrences across the country through the participation of hundreds of volunteer members of the public. Highlights include the following:

- The South African Reptile Conservation Assessment received much public attention in 2006/07. More than 20 volunteers joined the field team on various outings and 2 200 photographic records from more than 100 amateur photographers have been submitted to the burgeoning online virtual museum (see *www.reptiles.sanbi.org*).
- The launch of the *South African National Survey of Arachnida* took place in September 2006. This collaboration between the ARC and Sanbi is progressing well and has garnered much attention and support from the public and conservation and scientific communities.
- Sanbi's Custodians of Rare and Endangered Wildflowers has been so successful in its aim to involve local communities in monitoring and conserving their rare and threatened plants that it has now established offices in Pretoria and Pietermaritzburg.
- Sanbi's Birds and Environmental Change in South Africa Programme has progressed with its aim of using birds as indicators of ecosystem change and human well-being.

Knowledge and information management

Sanbi's strategic objectives include being the preferred source for biodiversity knowledge and information management in South Africa. Sanbi is actively consolidating its information resources and services, with the aim of supporting research, planning, implementation and monitoring by a range of partners and stakeholders.

In June 2007, the Minister of Environmental Affairs and Tourism, Mr Marthinus van Schalkwyk, announced that South African National Parks (SANParks) had been allocated R574,9 million for infrastructure development and to improve facilities in the country's nature reserves, in preparation for the 2010 FIFA World Cup™ and beyond.

Coupled with the R600 million that is being spent on the infrastructure component of the Expanded Public Works Programme, total expenditure on upgrading, as well as new rest camps, roads, fences and other infrastructure, will have exceeded R1 billion by 2010.

SANParks has signed an agreement with the FIFA accommodation and ticketing company, Match, providing football fans with the chance to have a truly unique South African experience during the World Cup.

In 2006, Sabif was transferred from the NRF to Sanbi with support from the Department of Science and Technology.

Sanbi's Biodiversity Geographical Information System (BGIS) Unit is expanding its services to provide easy access to biodiversity planning and related information for all South Africa's biomes. In 2006/07, the amount of freely available spatial biodiversity information on the BGIS website *(www.bgis.sanbi.org)* had increased substantially. Some 1:30 000 satellite imagery for southern Africa, together with a species-mapping tool, has been added to the site.

Conservation areas

South Africa is committed to meeting the World Conservation Union (IUCN) target of 10% of land area under protection.

There are a number of management categories of protected areas in South Africa, which conform to the accepted categories of the IUCN.

Scientific reserves

Scientific reserves are sensitive and undisturbed areas managed for research, monitoring and maintenance of genetic sources. Access is limited to researchers and staff. Examples of such areas are Marion Island and the Prince Edward islands near Antarctica.

Wilderness areas

These areas are extensive in size, uninhabited and underdeveloped, and access is strictly controlled with no vehicles allowed. The highest management priority is the maintenance of the intrinsic wilderness character.

Examples of wilderness areas are the Cederberg Wilderness Area and Dassen Island in the Western Cape, and the Baviaanskloof Wilderness Area in the Eastern Cape.

Marine protected areas

South Africa has 23 MPA's, which cover almost 19% of the coastline.

The World Parks Congress recommended that by 2012 a global system of effectively managed MPAs be implemented. The accepted target is to protect 20% of each habitat.

MPAs conserve natural environments and assist in the management of fisheries by protecting and rebuilding economically important stocks. Many of the new MPAs will be used to further develop and regulate coastal ecotourism opportunities.

National parks and equivalent reserves

SANParks manages several national parks throughout South Africa, excluding in Gauteng, North West and KwaZulu-Natal. The system of national parks is representative of the country's important ecosystems and unique natural features.

Commercial and tourism-conservation development and the involvement of local communities are regarded as performance indicators. These areas include national parks proclaimed in terms of the National Environmental Management: Protected Areas Act, 2003, provincial parks, nature reserves and indigenous state forests.

Some of these natural and scenic areas are extensive and include large representative areas of at least one of the country's biomes. Since 1994, five new national parks have been established and 379 000 ha have been added to the parks system. South Africa's national parks are:

- Addo Elephant National Park
- Agulhas National Park
- Augrabies Falls National Park
- Bontebok National Park
- Blyde River National Park
- Camdeboo National Park
- Golden Gate Highlands National Park
- Groenkloof National Park
- Kalahari Gemsbok National Park (part of the Kgalagadi Transfrontier Park)
- Karoo National Park
- Knysna National Lake Area
- Kruger National Park, which celebrated its 109th birthday on 1 June 2007
- Marakele National Park
- Mapungubwe National Park
- Mokala National Park
- Mountain Zebra National Park
- Namaqua National Park
- Richtersveld National Park
- TMNP (which incorporates the Cape of Good Hope, Table Mountain and Silvermine nature reserves)

- Tankwa Karoo National Park
- Tsitsikamma National Park
- Wilderness National Park
- West Coast National Park
- Wild Coast National Park.

The new Mokala National Park, which was proclaimed in June 2007, boasts 19 611 ha and is situated south-west of Kimberley.

The Department of Environmental Affairs and Tourism has invested about R120 million in social responsibility funding for infrastructure development in the Mapungubwe National Park, and a further R30 million has been spent on land acquisition.

During 2006/07, portions of the new Wild Coast National Park, located in a globally recognised biodiversity hotspot with more than 1 500 plant species alone, were declared. It is expected to draw more than 245 000 tourists by 2008, and 270 000 by 2013, creating some 3 260 direct and indirect jobs. The new Blyde River National Park was declared on Heritage Day, 24 September 2006. It lies in an area with over 2 000 plant species (of which 163 are Red Data plants), which is more than in the entire Kruger National Park.

The park is in the Blyde River Canyon, which has one of the richest troves of plants and animals in southern Africa. Some R18 million has been allocated for infrastructure for the park over the next three years, starting with a R10-million luxury hiking trail. The park is expected to boost the local economy by R500 million over the next decade.

Transfrontier conservation areas (TFCAs)

A TFCA is a cross-border region. The conservation status of the areas within it ranges from national parks, private game reserves and communal natural-resource management areas to hunting-concession areas.

Although fences, highways, railway lines or other barriers separate the constituent areas, they are managed jointly for long-term sustainable use of natural resources. Unlike in transfrontier parks, free movement of animals between the components of a TFCA is not always possible.

TFCAs aim to facilitate and promote regional peace, co-operation and socio-economic development. The success of TFCAs depends on community involvement. In turn, TFCAs are likely to provide local communities with opportunities to generate revenue.

TFCAs are expected to allow tourists easy movement across international boundaries into adjoining conservation areas.

The six identified TFCAs are as follows:

- Ai-Ais/Richtersveld TFCA
- Kgalagadi Transfrontier Park
- Limpopo/Shashe TFCA
- Great Limpopo Transfrontier Park
- Lubombo Transfrontier Conservation and Resource Area
- Maloti-Drakensberg Transfrontier Conservation and Development Area

In June 2006, a memorandum of understanding (MoU) between South Africa, Botswana and Zimbabwe was signed for the establishment of the Limpopo/Shashe TFCA. The proposed Limpopo/Shashe TFCA is 1 950 km^2 in extent, of which 270 km^2 are in South Africa, 720 km^2 are in Botswana and 960 km^2 are in Zimbabwe.

Biosphere reserves

The National Environmental Management: Protected Areas Amendment Act, 2004 protects South Africa's biosphere reserves, which are generally formed around existing core conservation areas.

Biosphere reserves include outstanding natural beauty and biological diversity, exist in partnership with a range of interested landowners, and can incorporate development, as long as it is sustainable, while still protecting terrestrial or coastal ecosystems.

South Africa's four biospheres are the:

- Kogelberg Biosphere Reserve, which was registered with the United Nations Educational, Scientific and Cultural Organisation (Unesco) in 1998.
- Cape West Coast Biosphere Reserve, which was listed in 2000. It covers 376 900 ha that include a number of threatened vegetation types and important bird-breeding sites.

In July 2007, Cabinet approved the Integrated Coastal Management Bill for tabling in Parliament. The purpose of the Bill is to:

- provide a legal and administrative framework that will promote co-operative, co-ordinated and integrated coastal development
- preserve, protect and enhance the status of the coastal environment as the heritage of all
- ensure coastal resources are managed in the interests of the whole community
- ensure there is equitable access to the opportunities and benefits derived from the coast
- give effect to certain of South Africa's international law obligations.
- ensure that existing access points to the coastal area are reinstated and properly maintained
- allow for the demarcation of access land.

Through the Kids in Parks Programme, the Department of Environmental Affairs and Tourism makes South Africa's cultural and biodiversity assets more accessible to the leaders of tomorrow.

Over the past three years, approximately 8 000 learners and 330 teachers were introduced to 14 of South Africa's national parks.

- Waterberg Biosphere Reserve in Limpopo, which was listed in 2001. It covers 1,4 million ha that include the Marakele National Park and the Nylsvlei Ramsar Site.
- Kruger-to-Canyons Biosphere Reserve, which was also listed in 2001, and covers more than 3,3 million ha that span the boundary between Limpopo and Mpumalanga. The core areas comprise 13 declared protected areas, with a major portion of the Kruger National Park as the largest core area.

National and cultural monuments

These are natural or cultural features, or both, and may include botanical gardens, zoological gardens, natural heritage sites and sites of conservation significance.

World heritage sites

By September 2007, there were 851 world heritage sites in 141 countries. Africa had 77 sites. A total of 166 were natural sites, 660 were cultural sites and 25 were mixed sites.

In May 1997, South Africa ratified the World Heritage Convention. The South Africa World Heritage Convention Committee is responsible for identifying possible world heritage sites in South Africa and co-ordinating the convention. The World Heritage Convention Act, 1999 (Act 49 of 1999), allows for cultural and natural sites in South Africa to be granted world heritage status. The convention obliges the South African Government to guarantee its implementation, ensure legal protection, and develop management plans and institutional structures for periodic monitoring.

The Act makes the principles of the convention applicable to South Africa's world heritage sites, and further provides for the adequate protection and conservation of these sites to promote tourism in a culturally and environmentally responsible way.

South Africa has eight world heritage sites proclaimed by Unesco, namely Robben Island; the Isimangaliso Wetlands Park; the hominid sites at Swartkrans, Sterkfontein and Kromdraai (known as the Cradle of Humankind); the Ukhahlamba-Drakensberg Park (a mixed natural and cultural site); the Mapungubwe Heritage Site; the Cape Floral Kingdom; the Vredefort Dome; and the Richtersveld Cultural and Botanical Landscape.

The Vredefort Dome is an ancient extraterrestrial impact site spanning the Free State and North West provinces. Formed two billion years ago, it is the world's most ancient meteorite impact site and the third-largest, measuring 140 km wide.

The world heritage status of Sterkfontein's fossil hominid sites was extended in July 2005 to include the Taung skull fossil site in North West and the Mokopane Valley in Limpopo.

The Cradle of Humankind has one of the world's richest concentrations of hominid fossils, evidence of human evolution over the past 3,5 million years.

Found in Gauteng and North West, the fossil sites cover an area of 47 000 ha. The remains of ancient forms of animals, plants and hominids are captured in a bed of dolomite deposited around 2,5 billion years ago.

Although other sites in south and east Africa have similar remains, the cradle has produced more than 950 hominid fossil specimens. The R347-million Cradle of Humankind development, initiated by the Gauteng Provincial Government, is the first public-private partnership of its kind in South Africa. The aim is to develop and manage the World Heritage Site as a premier tourist destination.

Other partners include the University of the Witwatersrand, which owns the Sterkfontein caves and is the major excavator of the cradle site.

In June 2007, the Richtersveld Cultural and Botanical Landscape was declared a world heritage site. It covers an area of 160 000 ha of dramatic mountainous desert in the north-west part of South Africa. It is the only area where the Nama still construct portable rush-covered domed houses, or lharu oms.

Habitat- and wildlife-management areas

These areas are subject to human intervention, based on research into the requirements of specific species for survival. They include conservancies;

provincial, regional or private reserves created for the conservation of species habitats or biotic communities; marshes; lakes; and nesting and feeding areas.

Protected land and seascapes

These areas are products of the harmonious interaction of people and nature, and include natural environments protected in terms of the Environment Conservation Act, 1989 (Act 73 of 1989), scenic landscapes and historical urban landscapes.

Sustainable-use areas

These areas emphasise the sustainable use of protected areas such as the Kosi Bay Lake System in KwaZulu-Natal.

Nature areas in private ownership are proclaimed and are managed to curtail undesirable development in areas with high aesthetic or conservation potential.

Conservancies are formed to involve the ordinary landowner in conservation. Landowners can establish a conservancy where conservation principles are integrated with normal farming activities.

In September 2007, South African National Parks (SANParks) announced the launch of the first South African National Parks Week.

This inaugural event, which was held from 18 to 24 September, and annually henceforth, is supported by First National Bank (funding patron).

The theme for the event was *Know your National Parks* and the main objectives of the week were to create awareness; instil a sense of pride in South Africa's natural, cultural and historical heritage; educate the public on the importance of nature and biodiversity; and give the public a broader understanding of the custodianship role played by SANParks in conservation issues. This initiative is in line with the organisation's efforts to bring national parks closer to the people. Some of the preceding initiatives are the Kids in Parks, Kruger to Kasie and Imbewu programmes, which are all aimed at developing a strong stakeholder base for national parks through awareness and education.

The public had free access to all national parks during the National Parks Week. Events included career-guidance exhibitions, hiking trails, photography competitions, exhibitions on various activities around the parks, game drives, evening boma braais, storytelling sessions and sports activities.

The highlight of the week's activities was the 75th anniversary celebration of the former Kalahari Gemsbok National Park, which now forms part of the Kgalagadi Transfrontier Park with Botswana.

Wetlands

Wetlands include a wide range of inland and coastal habitats – from mountain bogs and fens to midland marshes, swamp forests and estuaries, linked by green corridors of streambank wetlands.

South Africa became a contracting party to the Ramsar Convention in 1975. The country's Ramsar sites include Nylsvlei Nature Reserve, Blesbokspruit, Barberspan, Seekoeivlei, Ukhahlamba-Drakensberg Park, Ndumo Game Reserve, the Kosi Bay System, Lake Sibaya, the turtle beaches and coral reefs of Tongaland, the St Lucia System, Wilderness lakes, De Hoop Vlei, De Mond State Forest, Langebaan, Verlorenvlei, the Orange River Mouth Wetland and the Makuleke Wetland.

The Directorate: Biodiversity Management of the Department of Environmental Affairs and Tourism is responsible for the South African Wetlands Conservation Programme. The programme ensures that South Africa's obligations in terms of the Ramsar Convention are met.

The programme aims to protect wetlands in South Africa against degradation and destruction, while striving for the ideal of wise and sustainable use of resources, to ensure that the ecological and socio-economic functions of wetlands are sustained for the future.

South Africa is a member of Wetlands International, an international body dedicated to conserving the world's wetlands.

The Working for Wetlands Programme focuses on wetland restoration, while maximising employment creation; support for small, medium and micro-enterprises (SMMEs); and transfer of skills to the beneficiaries of the programme's projects.

The programme contributes directly to the objectives of the Expanded Public Works Programme and is a partnership between the departments of environmental affairs and tourism, of water affairs and forestry, and of agriculture. It is managed by Sanbi.

World Wetlands Day marks the date of the signing of the Convention of Wetlands on 2 February 1971 in the Iranian city of Ramsar. The theme for World Wetlands Day 2007 was *Wetlands and Fisheries.*

Zoological gardens

Founded in 1899, the National Zoological Gardens (NZG) of South Africa in Pretoria is the only zoo in South Africa with national status and membership of the World Association of Zoos and Aquariums, the African Association of Zoological Gardens, the International Union of Zooculturists and the International Association of Zoo Educators.

The Department of Environmental Affairs and Tourism has secured an investment of R500 million over the next three years, to ensure that all South Africa's national parks are exemplary energy-efficient showcases.

The NZG, considered one of the 10 best in the world, extends over an area of about 85 ha. In 2006, the zoo attracted more than 600 000 visitors.

On 1 April 2006, the zoo's collection included 2 889 specimens of 213 mammal species, 1 418 specimens of 221 bird species, 4 639 specimens of 217 fish species, 118 specimens of 12 invertebrate species, 529 specimens of 113 reptile species, and 88 specimens of five amphibian species.

These figures comprised the animals housed at the NZG in Pretoria, the two biodiversity conservation centres in Lichtenburg and Mokopane, and the satellite zoo and game park at the Emerald Animal World in Vanderbijlpark.

In April 2004, the NZG was declared a national research facility, subject to the provisions of the NRF.

The NRF is a government agency responsible for supporting and promoting research, and providing research facilities to encourage the creation of knowledge, innovation and development in all fields of science and technology. (See Chapter 17: *Science and technology*.)

In 2001, the NZG established the 203 ha Emerald Animal World housed at the Emerald Casino in Vanderbijlpark. The facility comprises a 189 ha game park and a 14 ha zoo.

The Emerald Animal World facility houses more than 760 animals representing 127 species of mammals, birds and reptiles. Animals that can be viewed there include white rhinoceros, hippopotamus, lion, cheetah, giraffe, various antelope and reptile species, and Cape fur seals. Most of the animals were provided by the national zoo's biodiversity conservation centres in Lichtenburg and Mokopane.

The Johannesburg Zoological Gardens, or Johannesburg Zoo, celebrated its centenary in 2004. The core business of Johannesburg Zoo, which is registered as a non-profit company, is the accommodation, enrichment, husbandry and medical care of wild animals.

It is also renowned for its successful breeding programmes involving several endangered South African bird species such as the wattled crane and ground hornbill. The zoo covers 54 ha and houses 2 070 animals of 365 species.

Breeding centres

There are a number of game-breeding centres in South Africa. The NZG of South Africa is responsible for the management of the Lichtenburg Biodiversity Conservation Centre, which covers an area of some 6 000 ha, and the Makopane Biodiversity Conservation Centre, covering an area of 1 333 ha.

The two centres supplement the zoo's breeding programme for various endangered animals, and the zoo's own animal collection.

The Lichtenburg Biodiversity Conservation Centre houses, among other animals, Père David's deer, pygmy hippopotamus, white rhinoceros, the endangered addax, and scimitar-horned and Arabian oryx. Large herds of impala, springbok, zebra, blesbok and red hartebeest also roam the area.

About 32 ha of the wetland area at the centre have been developed into a system of dams and pans, which serve as a natural haven for waterbirds such as spoonbills, kingfishers, ibises and herons.

The Mokopane Biodiversity Conservation Centre is home to an abundance of exotic and indigenous fauna such as lemur, the rare tsessebe, roan antelope and black rhino.

De Wildt Cheetah-Breeding and Research Centre, situated near Pretoria, is best known for its highly successful captive-breeding programme that contributed to the cheetah being removed from the endangered list of the *South African Red Data Book – Terrestrial Mammals* in 1986.

De Wildt also breeds a number of rare and endangered African species. The most spectacular of these is the magnificent king cheetah, which is a true cheetah, but with a variation of coat patterns and colouring. De Wildt also plays a major role in breeding and releasing wild dogs. It has donated breeding nucleuses of the highly endangered riverine rabbit and suni antelope to the Kruger National Park.

In May 2007, South Africa's first world heritage site, the Greater St Lucia Wetland Park, was renamed Isimangaliso Wetland Park.

The new name, meaning "wonder", became effective on 1 November 2007. The 220 000-hectare wetland park's consolidated boundaries now include a third of the length of the KwaZulu-Natal coastline and destinations such as Kosi Bay, Lake Sibaya, Sodwana Bay, uMkhuze Game Reserve, False Bay, Fannies Island, Charters Creek, Lake St Lucia, Cape Vidal and Mapelane.

The De Wildt Vulture Unit is a rehabilitation and holding facility for injured, poisoned and disabled vultures. The Hoedspruit Endangered Species Centre in Mpumalanga was initially established as a breeding programme for the then endangered cheetah. Following the success of the cheetah-breeding programme, it has evolved into a breeding programme for other endangered African animal species. The centre caters for, among other things, five species of vulture: Cape griffins, and white-backed, hooded, whiteheaded and lappetfaced vultures. The centre is also known for its wild-dog-breeding programme.

The Hoedspruit Research and Breeding Programme also includes the rare black-footed cat, the vulnerable African wild cat, ground hornbills (in co-operation with the NZG in Pretoria), bald ibis and the endangered blue crane. Elephant, white rhino, buffalo, caracal. Sable antelope, bushbuck and tsessebe have also been cared for and rehabilitated there.

Aquaria

There are well-known aquaria in Pretoria, Port Elizabeth, Cape Town and Durban.

The Aquarium and Reptile Park of the NZG is the largest inland aquarium in Africa, with the largest collection of freshwater fish. It is also the only aquarium in South Africa that exhibits a large variety of marine fish in artificial sea water.

The Port Elizabeth Oceanarium is one of the city's major attractions. Exhibits include an underwater observation area, a dolphin-research centre, various smaller tanks of 40 different species of bony fish and two larger tanks that display sharks and stingrays. East London has a smaller aquarium.

At the Two Oceans Aquarium situated at the Victoria and Alfred Waterfront, Cape Town, more than 3 000 specimens represent some 300 species of fish, invertebrates, mammals, birds and plants supported by the waters in and around the Cape coast.

UShaka Marine World in Durban incorporates both fresh and sea water, and is the fifth-largest aquarium in the world by water volume. It comprises Sea World, Dolphin World, Beach World, and Wet and Wild World.

Sea World incorporates a unique shipwreck-themed aquarium, a penguin rookery and a 1 200-seater dolphin stadium (the largest dolphinarium in Africa).

It also offers edutainment tours and special interactive activities such as snorkelling and scuba diving. In addition, it features a rocky touch-pool, where visitors can touch a starfish or sea cucumber with the help of specially trained guides.

Snake parks

The Transvaal Snake Park in Midrand, between Pretoria and Johannesburg, houses up to 150 species of snakes and other reptiles and amphibians from southern Africa and elsewhere. The emphasis is on the development of breeding programmes for animals in captivity.

The Fitzsimons Snake Park in Durban houses about 250 snakes, including the world's longest (reticulated python), most venomous (boomslang, puff adder and black mamba) and rarest (long-nose tree snake and Madagascar tree boa) snakes.

Up to 500 snakes hatch at the park each year. The Adventure Walk enables visitors to view a large variety of snakes that are kept in secure glass-viewing enclosures. The park also offers educational, interactive snake demonstrations, and junior and advanced herpetology (study of reptiles) classes.

The Port Elizabeth Snake Park at Bayworld has a wide variety of South African and foreign reptiles, including tortoises, boa constrictors, pythons, crocodiles, lizards and deadly venomous snakes such as cobras, mambas and rattlers.

Rare and threatened species, including the Madagascar ground boa, are housed safely in realistically landscaped glass enclosures.

The Aquarium and Reptile Park situated at the NZG in Pretoria houses 80 reptile species from all over the world.

The Hartbeespoort Dam Snake and Animal Park near Pretoria features one of the finest reptile collections in southern Africa. It offers seal shows and snake-handling demonstrations.

Marine resources

The South African coastline covers more than 3 200 km, linking the east and west coasts of Africa. South Africa's shores are particularly rich in biodiversity with some 10 000 species of marine plants and animals having been recorded.

The productive waters of the west coast support a variety of commercially exploited marine life, including hake, anchovy, sardine, horse mackerel, tuna, snoek, rock lobster and abalone.

On the east coast, squid, linefish and a wide range of intertidal resources provide an important source of food and livelihood for coastal communities. Marine life that is not harvested, such as whales, dolphins and seabirds, is increasingly recognised as a valuable resource for nature-based tourism.

The South African fishing industry, which was once concentrated in the hands of a few, largely white-owned companies, has undergone intensive transformation over the past 10 years.

New fisheries

Partnerships with industry and communities have enabled the Department of Environmental Affairs and Tourism to make major progress with the allocation of fishing rights.

Following the 2001 allocation of medium-term fishing rights of two to four years, in 2006/07 the department allocated long-term commercial fishing rights of eight to 15 years in 20 fishing sectors.

The biggest challenge in the rights-allocation process was to balance declining and migrating marine living resources with the high demand for access to these resources.

A total of 2 542 long-term commercial fishing rights were allocated, significantly improving the transformation profile of the industry. The estimated wholesale value of production in the fishing industry was approximately R4,5 billion in 2006/07.

Aquaculture

Marine aquaculture is an integral part of the department's strategy to diversify the fishing industry. In 2007, the department published the first-ever marine aquaculture policy for South Africa. The policy aims to create an enabling environment that includes transforming and broadening participation in the industry through SMME initiatives and facilitating finance and skills development.

In September 2007, the Minister of Environmental Affairs and Tourism, Mr Marthinus van Schalkwyk, published the *Policy for the Development of a Sustainable Marine Aquaculture Sector In South Africa*, following the completion of a two-year intensive stakeholder engagement process. The main purpose of the policy is to accelerate the development of the marine aquaculture industry.

The policies are also intended to improve the management and control of environmental impacts and increase the resource base to include a more diverse suite of species. Four marine aquaculture projects were expected to be initiated in each coastal province in 2007/08.

Aquaculture production in South Africa is in the region of 4 000 tons (t) a year, of which much is attri-butable to abalone and mussel production.

Abalone-farming was initiated in South Africa in the early 1990s, and by 1996, a number of small operators had entered the industry. The first 10 t were produced in 1997, and by 2003, production had increased to 515 t.

In 2006, some 900 t were produced and by April 2007, there were 15 commercial farms in operation. The industry continues to grow, and during 2006, the department issued 23 permits to culture the species.

While most of the farms are located in the Western Cape, most notably along the South Coast between Hermanus and Danger Point, and around the Saldanha Bay/St Helena Bay area on the West Coast, farms are also located as far north as Port Nolloth in the Northern Cape, and as far east as Haga-Haga in the Eastern Cape.

Abalone-farming has the highest economic value when compared with other farmed products and is the highest employer within the marine aquaculture sector.

The sector employs more than 800 people, constituting more than 80% of total marine-aquaculture employment. During 2006, the economic value of abalone was just above R141 million, while the total value of the sector was around R150 million.

This sector continues to grow while the wild abalone stocks continue to diminish. For example, the total allowable catch for abalone during 2006 was 223 t and was reduced to 125 t for 2007.

In October 2007, Cabinet supported a recommedation by the Department of Environmental Affairs and Tourism to suspend commercial wild abalone fishing from February 2008.

4x4 regulations

Following the successful implementation of the 4x4 regulations that provide for the controlled use of off-road vehicles in coastal zones, the monitoring of certain stretches of coast has indicated that the banning of off-road vehicles has enabled several shore-breeding birds, especially Damara tern and African black oystercatcher, to breed successfully on beaches once again.

According to conservationists from Ezemvelo KwaZulu-Natal Wildlife, the number of loggerhead and leatherback turtles hatching successfully on the beaches of northern KwaZulu-Natal has also increased since the ban was enforced.

Following the release in February 2007 of a report on the ecological and socio-economic impact of the beach-driving ban, Minister van Schalkwyk declared that for ecological reasons, South African beaches would not be re-opened to public recreational vehicles.

Interpretive and Informative Marine and Coastal Signage Programme

As part of its education and training programme, the department seeks to raise awareness in coastal areas. Following extensive consultation, more than 90 different themed interpretive and informative boards were developed and erected at beaches all along the coastline after the reproduction of more than 1 000 copies. These are valuable tools for increasing coastal and marine-environment awareness among beach visitors.

Adopt-a-Beach

The Adopt-a-Beach Programme was initiated to encourage groups of people to adopt or help look after a piece of coast in their region and link with others as part of a national project. Adopt-a-Beach is part of the overall Coastcare Programme and contributes towards the implementation of the awareness, education and training goals of the *White Paper for Sustainable Coastal Development in South Africa.* More than 250 groups have been registered and are being supported by the department.

Blue Flag Programme

Blue Flag is an international annual award given to beaches that meet excellence in the areas of safety, amenities, cleanliness and environmental standards.

South Africa is the first country outside Europe to win Blue Flag accreditation for its beaches. Since the inception of the programme in South Africa, a 75% growth rate in full status and pilot Blue Flag beaches has been achieved.

The Blue Flag beaches for 2007/08 were:

- Bronze Beach, Umhlanga
- Umhlanga Rocks Main Beach
- North Beach, Durban
- Bay of Plenty, Durban
- Westbrook Beach, north of Durban
- Addington Beach, Durban
- Margate Beach, south of Durban
- Ramsgate Main Beach, south of Durban
- Marina Beach, Southbroom
- Kelly's Beach, Port Alfred
- Wells Estate, Port Elizabeth
- Humewood Beach, Port Elizabeth
- King's Beach, Port Elizabeth
- Dolphin Beach, Jeffrey's Bay
- Lappiesbaai Beach, Stilbaai
- Grotto Beach, Hermanus
- Kleinmond Beach, near Hermanus
- Hawston Beach, near Hermanus
- Bikini Beach, Gordon's Bay
- Mnandi Beach, Strandfontein
- Clifton Fourth Beach, Cape Town.

Conservation challenges

South Africa faces many of the problems experienced by developing countries, in which rapid industrialisation, population growth and urbanisation pose a threat to the quality of the environment. The department is reforming environmental law to introduce reform in biodiversity conservation, pollution, waste management and environmental planning.

Urban environmental management

South Africa is an urbanised economy with 58% of the population living in cities and towns. By 2015, it is expected that 68% of the population will live in urban areas due to continued migration from rural areas mainly to the larger cities, which will lead to many environmental challenges in South Africa's cities.

The launch of the five-year Danish-funded Urban Environmental Management Programme (UEMP) in June 2006 marked a milestone in environmental co-operation between Denmark and South Africa. With their latest donation of R275 million, Denmark passed the R1-billion mark in donations made towards improving environmental quality in South Africa. Five key municipalities have been chosen as pilots for this programme, namely Cape Town, Durban, Ekurhuleni, Johannesburg and Sedibeng

(Vaal Triangle). The three provincial partners are Gauteng, Western Cape and KwaZulu-Natal.

Some R85 million has been earmarked for direct support to these cities with a reserve for other "hotspots" in future. People living in air-pollution hotspots such as the Vaal Triangle and South Durban can expect noticeable improvements over the next five years.

It is expected that the UEMP will lead to an improvement in the quality of life of nearly two million poor households in these five municipalities, whose health is affected by inadequate waste removal, and poor air quality and planning. It will contribute to economic growth by assisting cities to develop energy strategies and IDPs. The professional development of environmental health officers will also receive special attention.

Climatic and atmospheric change

In South Africa, climate change is evident and will continue, even if greenhouse gas (GHG) concentrations are stabilised. As such, it will continue to undermine sustainable development.

Expanded desertification in the semi-arid areas of the country is already a feature of the South African landscape. Climate-change modelling suggests a reduction of the area covered by the current biomes in South Africa by 35% to 55% in the next 50 years.

The Energy Research Centre at the University of Cape Town has estimated that the yearly cost to South Africa of not acting to adapt to the effects of climate change now will be about 1,5% of gross domestic product (GDP) by 2050.

Achieving the 2013 additional renewable energy target of 10 000 giga watt hours could have a positive impact on GDP of more than R1 billion, lead to additional government revenue of almost R300 million, provide additional income to low-income households of R128 million, and produce water savings of up to 16,5 million kilolitres per year, while creating just over 20 000 new jobs.

Over the longer term, climate change will exacerbate environmental degradation, desertification, biodiversity loss and resource scarcity. These are all sources of potential instability and conflict.

Africa is at risk from increasing water stress, especially in southern Africa. By 2020, between 75 million and 250 million people are likely to experience water shortages as a result of climate change.

In combination with increased demand, this will adversely affect livelihoods, freshwater fish resources and agricultural production. In some countries, yields from rain-fed agriculture could be reduced by up to 50% by 2020.

National Climate-Change Response Strategy

The strategy provides a comprehensive framework for dealing with climate-change issues in South Africa. The approach used in developing this strategy ensures, as far as possible, that climate-change response actions in South Africa facilitate sustainable development.

Government approved accession to the Kyoto Protocol of the UN Framework Convention on Climate Change (UNFCCC) in March 2002, demonstrating South Africa's commitment to further enhancing the effectiveness of environmental legislation. The Kyoto Protocol, which entered into force on 16 February 2005, is a legally binding instrument whereby developed countries undertake to reduce GHG emissions by at least 5% of their 1990 levels.

One of the protocol's features is the incorporation of market-based mechanisms designed to allow developed countries to achieve their required emission reductions at the lowest possible cost.

The Climate Change Summit was held on 8 June 2007 at the Cape Town International Convention Centre. The South African roadmap for a national climate policy recognises that the solution to the critical challenges the country faces should be addressed through integrated government planning, in collaboration with stakeholders through the National Climate Change Committee and a strengthened multilateral regime. To this end, the Inter-Ministerial Committee on Climate Change, led by the Department of Environmental Affairs and Tourism, initiated the Long-Term Mitigation Scenario process. This process will outline the range of ambitious but realistic scenarios of future climate action, notably long-term emission scenarios and their cost implications.

In addition, various national departments, provinces and cities are refining their sector plans in line with the National Climate Change Response Strategy. Working closely with industry, the department will also be finalising the updated GHG Inventory. All this will inform the first-ever Long-Term National Climate Policy, planned to be published during 2008/09.

South Africa is introducing the first carbon-development mechanism projects that use cleaner development to generate revenue from developed nations, to support the country's actions in response to climate change. Government also intends implementing the agreement it has with Business Unity South Africa on emissions, and using the National Environment Management: Air Quality Act, 2004 (Act 39 of 2004), to regulate the reporting of GHG gas emissions, and encourage cleaner production.

Erosion and desertification

Most South African soil is unstable. The country loses an estimated 500 mt of topsoil annually through erosion caused by water and wind.

About 81% of the total land area of South Africa is farmed. However, only 70% of this area is suitable for grazing. Overgrazing and erosion diminish the carrying capacity of the veld and lead to land degradation. This process has already claimed more than 250 000 ha of land in South Africa. The Department of Agriculture administers the Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983), in terms of which various mea-sures are being implemented to prevent or contain soil erosion.

In January 1995, South Africa signed the Convention to Combat Desertification, which was ratified on 30 September 1997. The main objectives of the convention include co-operation between governments, organisations and communities to accomplish sustainable development, especially where water resources are scarce.

The convention aims to support member countries in Africa to prevent desertification and its consequences. These countries support one another at technical and scientific level, as they share similar climatic conditions.

South Africa also acts as co-ordinator for the Valdivia Group for Desertification. The group consists of countries in the southern hemisphere, namely Australia, New Zealand, Argentina, Chile, Uruguay, South Africa and Brazil, whose aim it is, among other things, to foster scientific and technological co-operation.

The country has introduced legislation such as the Biodiversity Act, 2004 to promote the conservation of biodiversity, and fight desertification and land degradation.

The Department of Environmental Affairs and Tourism has also initiated projects to care for and protect the environment such as the Community-Based Natural Resources Management (CBNRM). The CBNRM has already led to the Machubeni Catchments Management Project. Other similar projects exist in Madibaneng, in Sekhukhune in Limpopo, and Mkhuzi in KwaZulu-Natal. These projects have been funded to the tune of R40 million and further projects are expected to be rolled out throughout the country.

By mid-2007, the department was finalising a partnership agreement with the DBSA for increased funding for CBNRM projects.

Waste management

The Department of Environmental Affairs and Tourism has prioritised four projects within the framework of the National Waste Management Strategy. They are:

- recycling
- a waste information system
- healthcare waste
- capacity-building.

Central to these are pilot projects that are being set up countrywide. The department welcomes partnerships with business to ensure that these projects are successful and become a core of better waste management in South Africa.

The National Environment Management: Waste Bill was approved by Cabinet in July 2007.

Government aims to reduce the amount of "big five" wastes – plastics, cans, paper, glass and tyres – that reach landfills, by 70% by 2022, and has plans for minimising and treating the remaining 30%. National initiatives embarked on to realise the goal of zero waste include agreements signed by government and members of priority waste-stream sectors such as the manufacturers of plastic bags and the waste-glass industry, and an MoU with the waste-tyre sector.

An agreement containing regulations governing plastic shopping bags was signed in September 2002 by the Minister of Environmental Affairs and Tourism and representatives from various labour and business organisations.

The agreement, which came into effect on 9 May 2003, stipulates that the thickness of plastic bags be 30 microns. However, manufacturers were allowed to continue using their existing machinery

to make bags of 24-micron thickness for the following five years before having to comply with the 30-micron standard.

The agreement states that printing will only be allowed on 25% of the surface area of plastic bags if the ink is not environmentally friendly. In situations where the ink is acceptable, this area can be increased to 50%. The department has a toll-free line to deal with queries about plastic bags.

The plastic bags agreement and supporting regulations have dramatically decreased the environmental impact of this highly visible waste stream, with a 50% reduction in the consumption of plastic bags since the introduction of the regulations.

As part of the implementation of the plastic bag regulations, Buyisa-e-Bag, a non-profit company was set up to promote waste minimisation and awareness initiatives in the plastics industry. The company is expected to expand collector networks and to create jobs, as well as to kick-start rural collection SMMEs and create additional capacity in NGOs.

Work is in progress to follow this success with targeted and customised agreements in respect of other problem waste streams, including tyres and glass. The compliance and enforcement of the regulations have been assigned to the South African Bureau of Standards.

The Radioactive Waste Management Policy, which assures citizens that there is a nuclear waste-management plan and strategy, is being implemented, starting with the creation of the National Committee on Radioactive Waste Management.

Water-quality management

The Directorate: Water-Quality Management of the Department of Water Affairs and Forestry is responsible for the quality management of national water resources in South Africa.

Water-quality management involves maintaining water resources for use on a sustained basis, by achieving a balance between socio-economic development and environmental protection. From a regulatory point of view, water-quality management entails the ongoing process of planning, developing, implementing and administering water-quality management policy; authorising water-uses that have, or potentially have, an impact on water quality; as well as the monitoring and auditing of the aforementioned.

The National Water Act, 1998 (Act 36 of 1998), further enables the Department of Water Affairs and Forestry to manage water quality through source-directed and resource-directed measures. Source-directed measures include the issuing of licences to water users with a potential impact on the resource.

The Act requires that all significant water resources be classified in accordance with the prescribed classification system. (See Chapter 22: *Water affairs and forestry.*)

Air pollution

The National Environment Management: Air Quality Act, 2004 was promulgated in 2005. The Act, which repealed the Atmospheric Pollution Prevention Act, 1965 (Act 45 of 1965), gives effect to the integrated pollution and waste-management policy to ensure that all South Africans have access to clean air.

In 2007, as part of implementing the Air Quality Act, 2004, registration certificates issued in terms of the Atmospheric Pollution Prevention Act, 1965 were reviewed.

To this effect, it has prioritised the key sectors whose permits require review. These include the petrochemical sector (seven operations); primary steel manufacture (nine operations); primary aluminium production (two operations); ferro-alloy industries, specifically chromium, vanadium and manganese (ferro-silicon) production (27 to 30 operations); pulp and paper industries (nine operations); and coal-fired power stations (national grid) (20 operations).

The Department of Environmental Affairs and Tourism has made significant strides in addressing air-pollution problems. In addition to the Durban Multipoint Plan for Air Quality Management, it has declared the Vaal Triangle air-shed as a priority area requiring urgent intervention by government and all stakeholders. It has established an air-quality monitoring system in the area, and six air-quality monitoring stations have been procured and installed to generate data. In addition, it has gazetted its intention to declare the Highveld the second national priority area in the near future.

Marine pollution, poaching and sustainability

South Africa has one of world's busiest shipping routes and has experienced many oil spills over the years. It is estimated that 80% of the world's tanker traffic passes South Africa's coast.

The department developed the National Contingency Plan for the Prevention and Combating of Pollution from Ships, in consultation with the South African Maritime Safety Authority and the Department of Transport. This includes disposing, recovering or stabilising the spilt oil and rehabilitating the environment.

The department successfully responded to several pollution incidents, which included, among other things, spills from the *Sea Elegance, Sealander Express, Cape Africa* and *BBC China*.

The department established the National Ballast Water-Management Task Group to develop measures aimed at regulating discharges of ballast water in South Africa's marine and coastal waters.

Sustainable Coastal Livelihoods Programme (SCLP)

The SCLP seeks alternative livelihood options for communities along the South African coast to minimise pressure on marine resources.

Subsistence fishing

The implementation of the Marine Living Resources Act, 1998 (Act 18 of 1998), has facilitated the allocation of formal rights to fishers in this sector for the first time.

It is an important part of the overall transformation of fisheries in South Africa. A primary goal is to allow subsistence fishers to obtain their food, or food security, through the harvesting of local resources. Consequently, the need to ensure that exploitation is sustainable is vital.

Identifying and working with fisher communities to promote orderly access has been emphasised. Implementation involves co-operation between all spheres of government and civil society.

Protecting South Africa's seas

To counter illegal activities along the 3 000-km coastline, as well as the country's 1 155 000-km^2 Exclusive Economic Zone (EEZ), the Department of Environmental Affairs and Tourism has boosted its compliance unit with the appointment of more than 80 fishery-control officers (FCOs) and 100 honorary FCOs, after the implementation of the Honorary Fishery Control Officers Policy. The department has also taken delivery of four new environmental-protection vessels as part of measures to protect marine and coastal resources.

Three of the four new protection vessels, *Lillian Ngoyi*, *Ruth First* and *Victoria Mxenge*, have been built to patrol up to the 200 nautical-mile limit from the shore. A fourth vessel, *Sarah Baartman*, patrols the most remote reaches of the EEZ and around the Prince Edward islands in the Southern Ocean. The vessels also conduct multilateral patrols in the Southern African Development Community (SADC) coastal states.

International co-operation

International alliances are essential for encouraging regional and international compliance with marine fisheries legislation.

South Africa has played a positive role in responding to international requests to help when dealing with alleged illegal, unreported and unregulated vessels. The request at the end of 2003, from Australia, to assist in the pursuit of the *Viarsa I* is the most prominent example of this kind. The vessel was alleged to have been involved with illegal harvesting of Patagonian toothfish in Australia before she fled to the high seas in the direction of South Africa.

Vessel monitoring

The department is making it obligatory for fishing vessels to have satellite technology on board so that it can monitor their movements. Five coastal nations in the SADC have taken the innovative step of linking their vessel-monitoring systems. South Africa, Namibia, Angola, Mozambique and Tanzania have signed an MoU that will allow them to share information about the movement of licensed boats along the Southern African coast.

Partnerships

To further counter illegal fishing and corruption, the department entered into partnerships with a broad spectrum of agencies, including national, provincial and local government, as well as NGOs.

Co-operation ensures that resources are used more effectively, resulting in a number of high-profile prosecutions and convictions.

In 2006/07, social-responsibility and poverty-relief programmes run by the Department of Environmental Affairs and Tourism created 13 887 job opportunities, exceeding the target of 12 500. The permanent job-creation target was also exceeded by almost 15%.

Other important partnerships have been forged with specialised units of the South African Police Service. In addition, SANParks and a number of provincial nature-conservation agencies conduct monitoring, control and surveillance activities within the MPAs.

Ecosystem Approach to Fisheries Management (EAFM)

In line with the Johannesburg Plan of Implementation, the department has begun to explore implementation of the EAFM.

The purpose of the EAFM is to plan, develop and manage fisheries in a manner that addresses the multiplicity of societal needs and desires, without jeopardising the options for future generations to benefit from the full range of goods and services (including fisheries and recreational opportunities) provided by marine ecosystems.

Good progress has been made through national and regional initiatives in implementing practical measures to mitigate the negative effects of fisheries on the ecosystem.

Transboundary research collaborations

The department has launched a project (as part of a regional initiative) to investigate the feasibility of an EAFM in the Benguela Current Large Marine Ecosystem (BCLME) region, by examining the existing issues, problems and needs related to EAFM, and developing different management options to achieve sustainable management of resources at an ecosystem level.

The BCLME Programme is a management-orientated programme aimed at boosting the infrastructure necessary to address cross-boundary problems associated with fishing, mining, oil exploration, coastal development, biodiversity and pollution.

Another programme implemented by the department is the scientific arm of BCLME, the Benguela Fisheries Interaction Training (Benefit) Programme.

Benefit is a joint initiative between South Africa, Namibia and Angola to address fisheries and other marine scientific investigations of important living-marine resources and their interactions with the environment. Training staff to undertake research and to achieve the levels of expertise necessary to provide advice to fisheries' management is also an important objective of Benefit.

Both the BCLME and the Benefit programmes are seen as New Partnership for Africa's Development (Nepad) initiatives, and are supported by SADC as regional projects.

West Indian Ocean Land-Based Activities Project (WIO-LaB)

WIO-LaB was launched at Robben Island on 5 November 2004. The WIO-LaB Project deals with the protection, prevention and management of marine pollution from land-based activities.

The commitment given to this project by the main donors, the United Nations Environmental Programme (UNEP) and the GEF, resulted in the appointment of a regional project manager in February 2000.

The department is assessing the effect that litter from rivers has on the oceans, is raising awareness of and educating communities about the importance of protecting the marine environment from pollution resulting from land-based activities, and has created task teams to deal with municipal water and the physical alteration and destruction of habitats.

National Policy for Seals and Seabirds

The National Policy for Seals and Seabirds in South Africa, and the National Plan of Action for Seabirds, aimed at reducing the incidental catch of seabirds in longline fisheries, have been finalised.

This follows growing concern over the numbers of seabirds, especially albatrosses, being killed by longline vessels in southern Africa. The plan sets out the required mitigation measures to reduce mortality of seabirds to below an interim target level of 0,05 birds/thousand hooks by South Africa's longline fisheries for hake, tuna, swordfish, Patagonian toothfish and sharks.

South Africa ratified the Agreement on the Conservation of Albatrosses and Petrels (ACAP) in November 2003. It is a multilateral agreement that seeks to conserve albatrosses and petrels by co-ordinating international activity to mitigate known threats to albatross and petrel populations. South Africa played a key role in negotiating the ACAP, and is home to many important populations of these

seabirds, including those on the sub-Antarctic Prince Edward islands.

Research observer scheme

The department introduced a formal research observer scheme for the following fisheries: deep sea hake trawl; inshore hake trawl; hake longline; pelagic purse seine; South Coast rock lobster; KwaZulu-Natal prawn trawl; large pelagics (experimental); horse mackerel midwater trawl; and deep sea experimental fisheries. This observer scheme provides valuable research data on, among other things, these fisheries' influence on the ecosystem.

Chemicals

Although relatively small by international standards, the chemical industry is a significant player in the South African economy, contributing about 5% to GDP and providing employment to about 200 000 people. The industry produces 1 301 t of primary and secondary process chemicals annually, making it the largest of its kind in Africa.

Several steps have been taken to align current legislation with the Constitution of the Republic of South Africa, 1996, as well as with global chemicals management:

- A special unit has been set up in the Department of Environmental Affairs and Tourism to implement a system aimed at preventing major industrial accidents, as well as systems for emergency preparedness and response.
- The minister has initiated an integrated safety, health and environment approach for the management of chemicals in South Africa. This government-level initiative, funded by the UN Institute for Training and Research, will involve a multistakeholder forum, including labour representatives, aimed at integrating legislation.

South Africa has signed the Stockholm Convention on Persistent Organic Pollutants and the Rotterdam Convention on Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade. It also played a part in the process of developing guidelines for the implementation of the Globally Harmonised System of Classification and Labelling of Chemicals.

At the Reduce, Reuse and Recycle Ministerial Conference in 2005, South Africa agreed to manage waste in a holistic manner, and became one of seven countries to sign a grant agreement on the African Stockpile Programme (ASP) with the World Bank, worth US$1,7 million. The country is also developing guidelines for the implementation of the Globally Harmonised System of Classification and Labelling of Chemicals. The funding was for the disposal of obsolete pesticides as part of the ASP. The department has begun implementing this programme throughout the country. Further work on training workers to handle chemicals was expected to be undertaken in 2007. By mid-2007, a pilot project for the collection of all obsolete pesticides possessed by farmers in Limpopo had begun. This pilot project is expected to serve as a benchmark for the roll-out of projects in other provinces.

Recycling

Since 1993, Collect-a-Can has been driving the recovery of used beer and cold drink cans in Southern Africa. About 750 000 t of used beverage cans have since been recovered for recycling. Collectors have earned R375 million in the process and the living environment has improved. The recovery rate of cans has increased from a mere 18% in 1993 to 67,5% in 2006 – placing southern Africa among the top can recyclers in the world. Collect-a-Can's unique schools competition has been running uninterrupted since 1993, contributing to continued environmental education.The efforts of Collect-a-Can have motivated many individuals, companies, NGOs and other organisations to become more environmentally conscious.

Environmental injustices

The negative effect of asbestos on the environment and other environmental-injustice issues are a priority for the Department of Environmental Affairs and Tourism. Efforts being undertaken by the South African Government to deal with the asbestos problem include:

- eradicating mine-dumps
- developing occupational health and safety regulations on asbestos
- developing safety standards and establishing a single compensation office
- formulating a code of best practice for the maintenance, demolition and disposal of asbestos-containing material
- abolishing the use of asbestos in road construction
- gradually phasing out asbestos-use in housing.

In September 2007, a new state-of-the-art marine research vessel, the *Ellen Khuzwayo*, was officially named. The vessel will play a key role in gathering scientific research on inshore marine resources and the marine environment.

In September 2007, proposed regulations for the prohibition of the use, manufacturing, import and export of asbestos were published for comment.

International co-operation

The department promotes South Africa's interests by participating in a number of international commissions, such as the International Commission for the Conservation of Atlantic Tunas, the Commission for the Conservation of Antarctic Marine Living Resources, and the International Whaling Commission.

The following important instruments have been acceded to, or ratified:

- Agreement for the Implementation of the Provisions of the UN Convention on the Law of the Sea on 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (Straddling Stocks Agreement)
- ACAP
- Convention for the Protection, Management and Development of the Marine and Coastal Environment of the East African Region and Related Protocols (Nairobi Convention)
- Convention for Co-operation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region and Related Protocol (Abidjan Convention)
- SADC Protocol on Fisheries.

South Africa, as the vice-chair for both the Abidjan and Nairobi conventions, accepted UNEP's request to host a joint meeting for these conventions in September 2007.

The ultimate goal of this joint meeting was to develop a long-term vision for coastal and marine management in sub-saharan Africa, and promote programmes that strengthen the implementation of these conventions.

One of the key programmes in this regard is the WIO-Lab, which South Africa will continue to implement in coastal areas to combat pollution from land-based activities.

United Nations Framework Convention on Climate Change

South Africa ratified the UNFCCC in 1997. The convention is a global commitment to take collective responsibility for climate change, and is a mandate for action to address the problem.

The convention was signed at the Rio Earth Summit in 1992 by heads of state and other senior representatives from 154 countries (and the European Community), and came into effect on 21 March 1994.

Since mid-1998, some 175 states have ratified or acceded to the convention.

The objective of the convention is to stabilise GHG concentrations in the atmosphere at a level that will not have an adverse effect on the climate.

The convention aims to control this level over a period of time, to:

- allow ecosystems to adapt naturally to climate change
- ensure that food production is not threatened
- enable economic development to proceed in a sustainable manner.

All countries that have ratified the convention are required to:

- develop, update and publish national inventories of anthropogenic emissions by sources, and removals by sinks of GHG (the GHG excludes those listed in the Montreal Protocol)
- formulate, implement and update national and regional programmes containing measures to mitigate climate change
- promote and co-operate in the development and transfer of technology that controls, reduces or prevents anthropogenic emissions of GHG
- promote sustainable management, conservation and enhancement of sinks and reservoirs of GHG
- co-operate in preparing for the adaptation to the impact of climate change
- take climate-change considerations into account where feasible, in relevant social, economic and environmental policies and actions, to minimise the adverse effects on the economy, on public health and on the quality of the environment
- promote and co-operate in the timeous and transparent exchange of information, including scientific, technological, socio-economic and legal information and research
- promote and co-operate in education, training and public awareness
- report to the Conference of the Parties.

Convention on International Trade in Endangered Species

Cites, also known as the Washington Convention, was negotiated in 1973 when it was realised that international trade in wildlife and wildlife products could lead to the overexploitation of certain species, thereby threatening them with extinction.

Cites came into force in South Africa on 13 October 1975. South Africa, together with the other 149 member countries, acts by regulating and monitoring international trade in species which are, or may be, affected by this trade.

Montreal Protocol

South Africa, as a signatory to the Montreal Protocol, has a national obligation to safeguard the ozone layer from depletion. South Africa has phased out chlorofluorocarbons (CFCs), halons, methyl chloroform and carbon tetrachloride - making it the only developing country in the world that has achieved so much in line with the phase-out schedule for developed countries. Although South Africa is classified as a developing country, its consumption of these substances is equal to that of some developed countries.

To demonstrate the country's commitment towards the phasing out of ozone-depleting substances (ODS), the following control measures constitute the overall position of South Africa on the Montreal Protocol:

- working groups were constituted to assist government in implementing the protocol
- regulated ODS can only be imported or exported after applying for an import/export permit through the Department of Trade and Industry under the Import and Export Control Act, 1963 (Act 45 of 1963)
- ODS can only be imported after an environmental levy of R5 per kg of CFC has been paid
- information is disseminated to interested and affected parties
- Africa network meetings, as arranged by the UNEP, are attended, where views, experiences and problems are shared to improve co-operation within the region and as per Nepad requirements.

Obligations include:

- ensuring that South Africa, as a party to the protocol, protects human health and the environment against harm from human activities that modify or are likely to modify the ozone layer
- ensuring the protection of the ozone layer by taking precautionary measures to equitably control total global emissions of substances that deplete the ozone layer, with the ultimate objective of totally eliminating them
- reporting and sending to the Ozone Secretariat data on production, imports, exports and consumption of regulated ODS as collected from dealers and relevant departments.

The Department of Environmental Affairs and Tourism has embarked on a national project to establish methyl bromide consumption trends, and a database of suitable, feasible and economically viable alternatives to methyl bromide.

This document will form the basis for an intensive research/evaluation project to phase out, in the short term, 20% of methyl bromide usage, mainly in the agricultural sector. As of 1 January 2005, all developing countries were to have reduce their respective methyl bromide consumption by 20%, as per the phase-out timetable.

Private-sector involvement

Numerous private bodies are involved in conservation activities. There are more than 400 organisations in the country concentrating on conservation, wildlife and the general environment, as well as more than 30 botanical and horticultural organisations.

Among these are:

- BirdLife South Africa
- Botanical Society of South Africa
- Centre for Rehabilitation of Wildlife
- Conservation International
- Delta Environmental Centre
- Dolphin Action Protection Group
- EcoLink
- Endangered Wildlife Trust
- Green Trust
- Keep South Africa Beautiful
- National Conservancy Association of South Africa
- Peace Parks Foundation
- South African National Foundation for the Conservation of Coastal Birds
- Trees and Food for Africa
- Wildlife and Environment Society of South Africa
- WWF-SA.

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BuaNews
Beeld
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Estimates of National Expenditure 2007, published by National Treasury
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South African National Parks
www.southafrica.info
www.collectacan.co.za
www.gov.za

Suggested reading

Hauf, T. *Essence of a Land: South African and its World Heritage Sites*. Pretoria: Green Vision Foundation, 2006.
Hinz, M. *Without Chiefs There Would Be No Game: Customary Law and Nature Conservation*. Windhoek: Out of Africa Publishers, 2003.
Hugo, ML. *Environmental Management: An Ecological Guide to Sustainable Living in South Africa*. Pretoria: Ecoplan, 2004.
Joubert, L. *Scorched: South Africa's Changing Climate*. Johannesburg: Wits University Press, 2006.
Karoo Veld: Ecology and Management, edited by K Esler *et al*. Pretoria: Briza, 2006.
Le Grange, M. *The Capture, Care and Management of Wildlife*. Pretoria: Van Schaik, 2006.
Spence, C. ed. *Ten Days in Johannesburg: A Negotiation of Hope.* Pretoria: Department of Environmental Affairs and Tourism, and the United Nations Development Programme, 2004.
Van Wyk, B and Gericke, N. *People's Plants: A Guide to Useful Plants of Southern Africa*. Pretoria: Briza, 1999.
Weinberg, P. ed. and photographer. *Once We Were Hunters: A Journey with Indigenous People*. Cape Town: David Philip, 2000.