

POCKET GUIDE TO SOUTH AFRICA



SCIENCE AND TECHNOLOGY

Pocket Guide to South Africa 2011/12 **SCIENCE AND TECHNOLOGY**

The aim of the Department of Science and Technology is to realise the full potential of Science and Technology (S&T) in social and economic development of human resources (HR), research and innovation.

The department funds basic research at universities and public entities, including science councils, so that they can train scientists, engineers and technologists and produce publications and patents. Almost 60% of the department's R4,4 billion budget is spent on public entities. Of the overall research and development (R&D) spend, the greatest portion is on the natural, medical and health sciences.

Strategies and programmes

The department has five strategic goals, namely to:

- develop the innovation capacity of the science system and thereby contribute to socio-economic development
- develop South Africa's knowledge-generation capacity
- develop appropriate human capital for research, development and innovation (RDI)
- build world-class RDI infrastructure
- position South Africa as a strategic international RDI partner and destination.

Human-capital development

The Department of Science and Technology's Human Capital and Science Platforms Subprogramme conceptualises, formulates and implements programmes aimed at developing and renewing science, engineering and technology human capital to promote knowledge generation, protection and exploitation.

Early in 2011, about 272 interns graduated from the Department of Science and Technology and the National Research Foundation (NRF) Internship Programme.

Since 2006, almost 750 interns have been hosted by various Department of Science and Technology institutions,

South Africa has the third-largest biodiversity-resource base in the world. In recent months, several biopiracy cases involving the pelargonium, rooibos and honey bush biological resources have been lodged with the European Patent Office. The Department of Science and Technology is supporting the Department of Trade and Industry in its initiative to amend intellectual property laws to broaden the protection that indigenous knowledge enjoys.



including science councils, national facilities and museums. By 2011, R29 million had been invested in the programme, with a further R45 million earmarked for the next three years.

At the sixth Science Centre World Congress in Cape Town in September 2011, the Minister of Science and Technology, Ms Naledi Pandor, announced the establishment of 26 science centres across South Africa. The centres are seen as vital to developing human capital and strengthening the country's S&T culture.

In September 2011, the South African Young Academy of Science (SAYAS) was launched. The SAYAS is intended to facilitate and enhance the participation of young scientists in the mainstream of R&D across all disciplines and to provide young scientists with the opportunity to use their knowledge to address South Africa's socio-economic challenges.

Astronomy

The Southern African Large Telescope was launched in November 2005, in Sutherland in the Northern Cape.

This is a multimillion-rand project involving Germany, Poland, the United States of America (USA), New Zealand and the United Kingdom (UK). It is the largest single optical telescope in the southern hemisphere.

Before and after the announcement of South Africa and Australia as hosts of the Square Kilometre Array radio telescope in May 2012, a number of initiatives have been undertaken.

South Africa has created a radio astronomy reserve in the Karoo, near the small town of Carnarvon in the Northern Cape.

The commissioning of the Karoo Array Telescope (KAT-7) was expected to be completed by the end of 2011. KAT-7 is a test bed for the KAT known as the MeerKAT radio telescope array which will start operations in 2016.

BioFISA is a three-year programme that is jointly funded by the Finnish Government and the Department of Science and Technology to build bioscience research capacity in southern Africa.

The programme is managed by the Southern Africa Network for Biosciences, which manages the funded projects in all bioscience nodes in southern Africa. It is also supported by the New Partnership for Africa's Development. The total amount expended in 2010/11 was R15,3 million.



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By July 2011, the South African Square Kilometre Array Project Office had awarded almost 300 grants and scholarships worth almost €15 million to students and scientists from several African countries. Some of this aid has been instrumental in helping to establish new radio astronomy and related undergraduate courses at universities in Botswana, Ghana, Kenya, Madagascar, Mauritius, Mozambique and Zambia.



By July 2011, five years before the MeerKAT goes online, 43 000 hours of observing time, including a consortium led by internationally renowned astronomers, had been allocated for astronomy.

Nanotechnology

Nanotechnology, unlike other technologies, can find applications in virtually all areas of human life. In spite of it being in its beginning stages, some of the known issues related to nanotechnology suggest a wide spectrum of potential societal impact. For a society to switch from a merely passive, observational role to one of active participation, public discourse about nanotechnology must be encouraged.

Two nanotechnology innovation centres were established at the council for Scientific and Industrial Research (CSIR) and Mintek. The two nano-innovation centres have a budget of R134 million over the current Medium Term Expenditure Framework.

In 2011, the department acquired a world-class, R30-million high-resolution transmission electron microscope that was expected to be commissioned in the latter part of the year.

The Department of Science and Technology, in partnership with the University of the Western Cape and the Nelson Mandela Metropolitan University, hosted the second nanoscience and nanotechnology summer school in November 2011, targeting Honours and Master's Degree students interested in the nanoscience and nanotechnology fields.

The vision for the school is to create a pool of nanoscientists sufficiently trained to conduct nanoscience research. The theme for 2011 is Nanoscience Characterisation Techniques.

Indigenous Knowledge System (IKS)

The indigenous knowledge of many communities embodies a deeply spiritualised and ancient relationship with the Earth's systems and cycles.

The National Recordal System is the largest fingerprint initiative of the region to document and record indigenous knowledge.

Two indigenous knowledge research chairs have been awarded as part of the South African Research Chairs Initiative. The first was awarded to the University of KwaZulu-Natal for work in the field of traditional medicines. The second has been awarded to Walter Sisulu University. These two chairs represent significant injections into the development of national research capacity in IKS.

The Department of Science and Technology also established indigenous knowledge studies centres of excellence at the universities.

The centres will play a defining role in generating highly qualified HR capacity in IKS.

Biotechnology

South Africa's research institutions and universities are conducting biotechnology research to increase production of crops suited to local conditions, enhance crop nutritional value, and improve preservation and processing methods resulting in novel and improved food products.

Research is being conducted on understanding the nutritional components of food indigenous to South Africa, with the aim of making those with a high nutritional value available and accessible to the majority of people.

South Africa is classified as one of the 14 mega biotech countries in the world, and the only one in Africa. These countries, including South Africa, have a special responsibility to ensure that the potential impacts of genetically modified organisms on human or animal health; on the environment; together with their probable socio-economic impact, are carefully measured, assessed and estimated before they are released. A favourable risk-benefit ratio can only be ensured in this way.

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The Centurion Aerospace Village (CAV) was launched in November 2011. It is an initiative by the Department of Trade and Industry to develop a high-tech and advanced manufacturing aero-mechanical and defence cluster adjacent to the Waterkloof Air Force Base in Centurion.



While its primary aim is to integrate local aerospace and defence companies into the global supply chains to become suppliers of choice to original equipment manufacturers such as Boeing, Airbus and Spirit Aviation, the CAV will also be home to new process technologies within the aerospace sector.

Supporting innovators **Technology Innovation Agency (TIA)**

TIA was formed from a merger of seven organisations funded by the Department of Science and Technology, including the Advanced Manufacturing Technology Strategy, Bio-technology Partnerships and Development, Cape Biotech, Innovation Fund, LIFElab, PlantBio and Tshumisano, and is mandated to stimulate and intensify technological innovation to improve economic growth and the quality of life of all South Africans.

The Department of Science and Technology intends to create an institutional and policy framework that advances and sustains a coordinated and responsive National System of Innovation. TIA is the key agency in this regard.

By June 2011, about 26 investments had been identified; 11 had a very strong likelihood of enhancing job creation and socio-economic development; 11 others had proceeded beyond proof of concept stage; and four were ready for commercialisation.

In 2011, R433 million was allocated to the TIA.

National Advisory Council on Innovation (Naci)

The Naci Act, 1997 mandates the council to advise the Minister of Science and Technology, and through him/her the Cabinet, on the role and contribution of innovation (including S&T) in promoting and achieving national objectives.

In November 2011, the Department of Science Technology, the Human Sciences Research Council (HSRC's) Centre for Science, Technology and Innovation Indicators, and the Naci hosted a workshop on measuring and monitoring innovation in South Africa. The purpose was to review the scope and

objectives of the South African Innovation Survey and to evaluate other indicators that need to be monitored to better inform policy-making in this area.

South African National Space Agency

Sansa is mandated by the Sansa Act, 2008 to promote the peaceful use of space, foster international cooperation in space-related activities and create an environment conducive to industrial development in space technology through research, human capital development, outreach programmes and infrastructure development.

National research facilities

The NRF manages South Africa's national research facilities. It promotes and supports basic and applied research. The NRF oversees the following national research facilities:

- South African Astronomical Observatory
- Hartebeesthoek Radio Astronomy Observatory
- Hermanus Magnetic Observatory
- South African Institute for Aquatic Biodiversity
- South African Environmental Observation Network
- National Zoological Gardens
- iThemba Laboratory for Accelerator-Based Sciences.

Science councils

Agricultural Research Council (ARC)

The ARC's functions are carried out through 11 research institutes whose activities are grouped under five divisions:

- field crops (grain and industrial crops)
- horticulture
- animal production and health
- natural resources and engineering
- technology transfer.

The ARC is also responsible for maintaining national assets and undertaking programmes or rendering services that are required from time to time by the department and other stakeholders.

Council for Scientific and Industrial Research

The CSIR is one of the leading S&T, R&D and implementation organisations in Africa, with its main site in Pretoria. The

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organisation is represented in other provinces of South Africa through regional offices. In 2011/12, R687 million was allocated to the CSIR.

Mintek

Mintek, South Africa's national mineral-research organisation, is one of the world's leading technology organisations specialising in mineral processing, extractive metallurgy and related areas.

Collaborating with industry and other R&D institutions, Mintek provides service testwork, process development, consulting and innovative products to clients worldwide.

The Department of Mineral Resources granted Mintek R90 million over the 2011/14 period for the rehabilitation of derelict and ownerless mines in South Africa.

Human Sciences Research Council

The core business of the HSRC is to conduct large-scale, policy-relevant, social-scientific projects for public-sector users, non-governmental organisations (NGOs) and international development agencies. This is done in partnership with researchers globally, but specifically in Africa. In 2010/11, the HSRC undertook more than 150 projects and an assortment of initiatives.

Medical Research Council (MRC)

The MRC was established in July 1969 as an independent statutory body to coordinate health and medical research activities throughout South Africa, operating as a statutory science council functioning within the ambit of the MRC Act, 1991, as well as the Public Entities Act, 1997.

South Africa's Prof. Malegapuru Makgoba was elected vice-president of the International Council for Science (ICSU) in October 2011. Makgoba is a trained physician and an internationally recognised molecular immunologist. He will serve as vice-president for three years, while continuing to serve as vice-chancellor of the University of KwaZulu-Natal. Makgoba was also the recipient of the 2011 National Research Foundation President's Lifetime Achievement Award.



Council of Geoscience (CGS)

The CGS supplies the country with geoscience data to establish a safe and cost-effective physical infrastructure.

South African Bureau of Standards (SABS)

The SABS produces, maintains and disseminates standards. It promotes standardisation in business and government, and administers compulsory standards on behalf of the State. It also certifies international quality standards.

Other important research bodies and areas

National Institute for Tropical Diseases

The National Institute for Tropical Diseases in Tzaneen, Limpopo, is responsible for the ongoing assessment of malaria-control programmes carried out by various authorities in South Africa.

Control methods are assessed and recommendations made to the appropriate authorities regarding equipment, insecticide usage and application. A malaria-reference service is also provided. Malaria tests are carried out by the institute and statistical analyses of data pertaining to the programme are undertaken.

In September 2011, the National Research Foundation (NRF) announced the recipients of the NRF President's Awards 2011, which honour the career achievements of rated researchers acknowledged by their peers as world leaders in their fields.

The following researchers received A-ratings:

- Prof. Frank Brombacher (University of Cape Town [UCT])
- Prof. David Glasser (University of the Witwatersrand [Wits])
- Prof. Shabir Madhi (Wits)
- Prof. John Pettifor (Wits)
- Prof. Lyn Wadley (Wits)
- Prof. George Janelidze (UCT)
- Prof. Alan Weinberg (University of South Africa).

Other awards included:

- Lifetime Achievement Award: Prof. Malegapuru W Makgoba (University of KwaZulu-Natal)
- Transformation of the Science Cohort Award: Prof. Bongani M Mayosi (UCT)
- Champions of Transformation Capacity Development at South African Higher Education Institutions Award: Prof. Yusef Waghid (Stellenbosch University).



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Mine-safety research

The activities of the Safety in Mines Research Advisory Committee are aimed at advancing the safety of workers employed in South African mines. The committee is a statutory tripartite subcommittee of the Mine Health and Safety Council. It has a permanent research-management office managing the rock engineering, engineering and mine occupational health fields of research.

Energy research

South Africa's National Energy Research Institute (Saneri) is the public entity entrusted with the coordination and undertaking of public interest energy research, development and demonstration. Saneri was established in October 2004 as a subsidiary of the Central Energy Fund (Pty) Ltd, the state energy company in South Africa.

Agricultural research

The ARC, several universities and various private-sector organisations conduct agricultural research.

Water research

Water research in South Africa is coordinated and funded by the Water Research Commission in Pretoria.

The organisation's most active partners in water research are:

- universities and universities of technology
- professional consultants
- science councils
- water and waste utilities
- NGOs.

Coastal and marine research

The NRF supports marine and coastal research in partnership with the Department of Environmental Affairs and the South African Network for Coastal and Oceanic Research. The Chief Directorate: Marine and Coastal Management advises on the use of marine living resources and the conservation of marine ecosystems, by conducting and supporting relevant multidisciplinary scientific research and by monitoring the marine environment.

Sustainable use and the need to preserve future options in using marine ecosystems and their resources are guiding objectives in the research and advice provided by the chief directorate.

Environmental research

The Department of Environmental Affairs annually finances several research and monitoring programmes.

The programmes focus on, among other things, waste management and pollution, nature conservation, river management, the coastline and marine environment, and the atmosphere.

