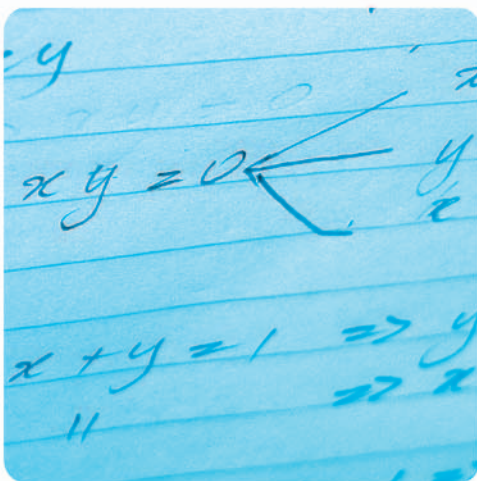
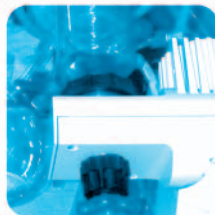


# Faculty of Natural and Agricultural Sciences

## Report 2008





**Faculty of**

**Natural and  
Agricultural Sciences**

**Report 2008**

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# Contents

<b>Contents</b>	<b>iii</b>
<b>Preface</b>	<b>1</b>
<b>Faculty news</b>	<b>3</b>
<b>Departments:</b>	
<b>Agricultural Sciences</b>	<b>07</b>
- Agricultural Economics	08
- Animal, Wildlife and Grassland Sciences	13
- Plant Sciences	20
- Soil, Crop and Climate Sciences	29
<b>Building Sciences</b>	<b>37</b>
- Architecture	38
- Quantity Surveying and Construction Management	42
- Urban and Regional Planning	46
<b>Natural Sciences</b>	<b>49</b>
- Chemistry	50
- Computer Science and Informatics	61
- Genetics	64
- Geography	68
- Geology	71
- Mathematical Statistics and Actuarial Science	77
- Mathematics and Applied Mathematics	80
- Microbial, Biochemical and Food Biotechnology	82
- Physics	94
- Plant Sciences	20
- Zoology and Entomology	99
<b>Centres</b>	<b>109</b>
- Disaster Management Training and Education Centre for Africa (DIMTEC)	110
- Environmental Management	113
- Lengau Agricultural Development Centre	117
- Microscopy	120
- Sustainable Agriculture and Rural Development	125
<b>Experimental Farm</b>	<b>129</b>
- Paradys Experimental Farm	130
<b>Institute</b>	<b>133</b>
- Groundwater Studies	134
<b>Statistical data</b>	<b>137</b>
<b>Glossary</b>	<b>141</b>

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## Preface

# From the Dean's Office

In 2008 the Faculty of Natural and Agricultural Sciences once again lived up to its vision to be acknowledged as a faculty that is at the forefront of the practice of natural and agricultural science where the highest levels of quality and credibility are reflected.

During the year the faculty not only remained one of the leaders in training and career development in the natural and agricultural sciences, but it also made a concerted effort to enlarge its international footprint and to establish itself internationally. This is evident in the visits of staff from the faculty to universities such as the USA-based University of Minnesota and Virginia Polytechnic Institute and State University (Virginia Tech) and the extension of international agreements between the University of the Free State (UFS) and these institutions. The faculty also had the privilege of hosting a high-level delegation from the University of Minnesota on the Main Campus in Bloemfontein in August 2008.

The turmoil in the international markets firstly led to very high oil prices, which spilt over to the grain markets and high food prices. This, in turn, led to high inflation levels and therefore high interest rates. Eventually the exchange rate also deteriorated against the major currencies. In the latter part of the year the whole situation was turned upside down with the collapse of the financial markets. The faculty did not escape this and the price of equipment for which orders were placed sky rocketed. Innovative skills had to be applied to remain on track with our equipment strategy.

Although 2008 was an exceptionally difficult year for the UFS and the institution had to bear the brunt of the Reitz video and the reaction of the national and international community, the faculty still managed to perform and expand its core business.

The faculty offers multi-disciplinary and holistic courses to send skilled and capable students into the South African workplace and to empower the labour force. Our general and extended programmes are continuously assessed and improved in order to improve our throughput rates and quality of teaching.

The staff at the faculty worked tirelessly this year to broaden our product offering and to provide our students with the best quality teaching in the country. I applaud their efforts of expanding capacity, developing programmes and strengthening re-



*Prof. Herman van Schalkwyk.*

lationships both within and outside the faculty and the university.

I also want to applaud the staff and students of the faculty with their achievements this year – whether it is on a personal level, in their capacity as staff member of their respective department/centre or for the faculty. To mention a few:

- Ms Estelle Heideman HIV/Aids coordinator of the Lengau Agricultural Development Centre, received a bursary to participate in a leadership programme in the United States of America (USA), which trains female leaders in South Africa who contribute to the prevention of HIV at a local, regional and national level;
- In the Department of Agricultural Economics, Prof. Johan Willemse, known for his contribution towards agriculture, was appointed on the non-executive board of Absa;

## Staff in the dean's office



The staff working in the dean's office are, from the left, front: Ms Stefanie Naborn, Manager: Marketing and Liaison, Ms René Bloem, Secretary, Prof. Neil Heideman, Vice-Dean: Faculty of Natural and Agricultural Sciences; back: Mr Clasie Claassen, Assistant Administrative Officer, Mr Johan Kruger, Faculty Manager, Ms Lorinda Rust, Secretary, and Ms Mitzie Cloete, Typist/Clerical Assistant.

- Prof. James du Preez, Departmental Chair of the Department Microbial, Biochemical and Food Biotechnology, received the silver medal for exceptional published research awarded at the biennial conference of the South African Society for Microbiology hosted in Graham's Town. It was only the seventh time since 1986 that the medal was awarded;
- A study of the UFS about how the change in the packaging of DNA with cellular development is influenced by the expression of genes, in which Prof. Hugh Patterson played a leading role, was published in a leading peer-reviewed scientific journal *Proceeding of the National Academy of Sciences* of the USA (PNAS). The PNAS journal has an impact factor of 10, which means that studies published in this journal are referred to by ten other scientific studies within the scope of two years;
- Prof. Riaan Luyt, professor in Chemistry and head of the Natural Sciences Programme at the Qwaqwa Campus, received an honorary medal from the Polymer Institute of the Slovak Academy of Sciences during a conference hosted in the High Tatras mountains of Slovakia;
- Prof. Maryke Labuschagne from the Department of Plant Sciences was the recipient of the National Science and Technology Forum's (NSTF) research capacity-development award. A team consisting of Prof. Jan van der Westhuizen and Dr Susan Bonnet from the Department of Chemistry, Prof. Kenneth Swart and Prof. Thinus van der Merwe from FARMOVS-PAREXEL also

received the innovation award for an outstanding contribution to science, engineering and technology by either an individual or a team over the last ten years from the NSTF;

- Prof. Maryke Labuschagne received a second prestigious national award for her research when the 2008 Cereal Science and Technology - SA's (CST-SA) Award for research and development was awarded to her; and
- Prof. Ivan Horak, extraordinary professor at the university's Department of Zoology and Entomology, became the third person in the history of the UFS to receive the D.Sc. degree.

In closing I would like to thank the faculty's lecturing staff for their support and enthusiasm during the past year. However, none of these achievements would have been possible without the interest and hard work of the administrative staff.

During 2008 we have all worked together to live up to the faculty's motto: "There is no substitute for excellence!" This report covers the activities of the faculty in 2008. It is a reflection of a year's commitment from a team of highly skilled academic and support staff.

**Prof. Herman van Schalkwyk**  
**Dean: Faculty of Natural and Agricultural Sciences**  
**University of the Free State**



# Faculty news

## Successful visit from delegation of the University of Minnesota

A senior delegation from the University of Minnesota in the United States of America (USA) paid a very successful visit to the University of the Free State (UFS) in May 2008 to explore ways of strengthening already existing ties between the two institutions.

Teacher training, capacity building in health sciences and student preparedness were among the areas of cooperation that were investigated, within the context of the Strategic Academic Cluster initiative of the UFS. Poverty reduction strategies were also a strong focus area.

The Faculty of Natural and Agricultural Sciences has had a cooperation agreement with the University of Minnesota's Department of Applied Economics since 2002 and the exchange of staff



*During the visit are, from the left: Prof. Herman van Schalkwyk, Dean: Faculty of Natural and Agricultural Sciences at the UFS, Prof. Robert Jones, Senior Vice-President: System Academic Administration at the University of Minnesota, Dr Meredith Quiad, Associate Vice-President and Dean: International Programmes, University of Minnesota, Prof. Teuns Verschoor, Acting Rector of the UFS and Prof. Ezekiel Moraka, Vice-Rector: Student Affairs at the UFS.*

has been taking place on a regular basis. This agreement will be expanded and both institutions are now exploring the possibility of

applying it across faculties. Both institutions have committed seed funding to formalise the cooperation agreement.

## 50 years of Agriculture celebrated



*The faculty celebrated 50 years of the teaching of agriculture at the UFS in November 2008. Part of the celebrations was a seminar with the theme "Challenges in a changing agricultural environment". Some of the guest speakers are, from the left: Mr Corwyn Botha, Chairman: Agri Business Chamber and Managing Director of the Cape Agri Group, Mr Motsepe Matlala, President of NAFU, Mr Hans van der Merwe, Executive Head: Agri SA, Prof. Herman van Schalkwyk: Dean: Faculty of Natural and Agricultural Sciences at the UFS, and Mr Sugar Ramakarane, Head: Department of Agriculture, Free State Province.*

## Winners of NSTF awards assist with recruitment of students



Here are, from the left: Dr Martin Ntwaeaborwa, senior lecturer at the Department of Physics and finalist in the category for black researchers, Prof. Kenneth Swart, FARMOVS-PAREXEL, Prof. Maryke Labuschagne, head of Plant Breeding at the UFS's Department of Plant Sciences and female recipient of the award for the development of research capacity over the past five to ten years, and Prof. Jan van der Westhuizen, Department of Chemistry at the UFS; front: Ms Kedibone Aphane, MRC. Prof. Swart and Prof. Van der Westhuizen were the leaders of the team who received the award for the development of innovation by a corporate organisation or institution.

Representatives of the South African Medical Research Council (MRC) visited the UFS to recruit students who want to study in the fields of sci-

ence, engineering and technology. To assist with the recruitment, the winners of awards made by the National Science and Technology Forum (NSTF) earlier this year,

made presentations to create an interest amongst students. The UFS had four finalists of whom two were the winners in their respective categories.

### Young scientists learn what faculty can offer



Young science lovers gathered in Sasolburg for the annual Sasol TechnoX in August 2008. The faculty's exhibition captured the learners' attention through an interactive representation of the application fields of science. Delegates from the Departments of Mathematics and Applied Mathematics, Chemistry, Zoology and Entomology, as well as UFS Marketing stood ready to answer the questions of the 20 832 learners who attended the event. Pictured here is Theo Viljoen, M.Sc. student in Forensic Entomology, sharing interesting facts regarding insects with learners.

## Two UFS academics appointed on the Land Bank Board



Prof. Herman van Schalkwyk (left), Dean: Faculty of Natural and Agricultural Sciences, and Mr Theo Potgieter from the UFS School of Management were appointed on the Land Bank Board in March 2008. Prof. van Schalkwyk was appointed as Director and Deputy Chairperson and Mr Potgieter as Director of the Board. The appointments were made by the Minister of Agriculture and Land Affairs, Ms Lulu Xingwana, and are effective for a period of four years.

## UFS extends exchange agreement with USA university



Here are, from the left, front: Dr SK de Datta, Vice-Rector: International Affairs, VT, Prof. Herman van Schalkwyk, Dean of the Faculty of Natural and Agricultural Sciences, UFS, Dr Martin Ntwaeaborwa, senior lecturer at the Department of Physics, UFS; back: Prof. Jim McKenna, Department of Crop, Soil and Environmental Affairs, VT, Prof. Izak Groenewald, Director of the Centre for Sustainable Agriculture and Rural Development at the UFS and responsible for the faculty's international liaison, Dr Michael Bertelsen, VT's international office, Dr Aldo Stroebel, Head: Internationalisation at the UFS and Dr Liesel Herselman, senior lecturer at the Department of Plant Sciences, UFS.

A delegation from the faculty visited the Virginia Tech University (VT) in the USA in June 2008 to confirm and extend the existing student exchange agreements between the two institutions.

During the visit the agreement, which started in 1997, was extended for the next five years. More than 150 students from both institutions have already taken part in this exchange agreement and it is the most successful student exchange agreement that VT is involved in. Although agricultural students from the UFS initially took part in the agreement, it was extended to other departments in the faculty and also to the rest of the UFS.

## Itjoriseng Project launched



The faculty launched the Itjoriseng Project on the Main Campus in Bloemfontein in March 2008. The aim of the project is to improve the skills of teachers in the subjects Mathematics and Physical Science for Grades 10–12. "Itjoriseng" is the Sotho word for "sharpen yourself". At the launch were, from the left: Mr Mzamo Jacobs, Director: Curriculum Development for Further Education and Training, Free State Department of Education, Mr Johan Kruger, Faculty Manager, Ms Elna Marais, Chief Education Specialist: Curriculum Development, Free State Department of Education, and Prof. Herman van Schalkwyk, Dean: Faculty of Natural and Agricultural Sciences at the UFS.

## 2007 Faculty report launched



The faculty once again produced another report in which the various departments and centres highlighted their activities for 2007. The report was so well received that a second edition had to be printed. Here are some of the departmental chairpersons during the launch of the report in June 2008.



Centre for

# Environmental Management

“Graduates are in demand by large companies, government and nature conservation bodies” - Prof. Maitland Seaman.

## Overview

The Centre for Environmental Management in the Faculty of Natural and Agricultural Sciences, incorporating the BloemWater Chair in Water Environmental Management, has established an envied niche for itself in South Africa. The niche is based on three intertwined components, namely the master's and doctoral programmes, short courses, and a research and contract component.

The centre is now an established centre of expertise in aquatic ecology, which carries out a number of applied projects and provides appropriate services to communities in the central part of South Africa. BloemWater, the regional water services agency, plays a central role in the development of this part of the centre's work. The BloemWater Chair in Water Environmental Management came into being on 1 July 2003 and Prof. Maitland Seaman, Director of the centre, is also the incumbent of the BloemWater Chair in Water Environmental Management.

The master's programme developed gradually but strongly around Project Management, Environmental Assessment, Environmental Management Systems, Integrated Environmental Management and Sustainable Development, into which a number of special skills and disciplines are woven.

From approximately 100 applicants, the master's programme took in about 50 students in 2008.



*Prof. Maitland Seaman.*

The intake increases in diversity every year. In 2008 around 30% of the students were from Southern African Development Community (SADC) countries and a few were from the rest of Africa, making this a truly continental programme. The programme is based on 37 full days of contact time at the Main Campus of the University of the Free State (UFS) in Bloemfontein, split into one session per semester.

The programme is an integrated one. As the environment presents a very wide field, there is a perceived need to produce graduates with a healthy overview of the South African environment. Grad-



uates are in demand by large companies, government and nature conservation bodies.

The centre turned 14 years old in 2008. This achievement was celebrated with a workshop and a formal function, to which all role players and lecturers were invited. Much has happened since the first students entered the programme in July 1994. The centre has streamlined the programme and updated the courses continuously, sometimes drastically. The programme was originally very science-oriented and had limited management focus. Efforts have been made to correct biases and accommodate the changing



Attending the celebration of the 14<sup>th</sup> year of the centre's existence are, from the left: Dr Daan Toerien, Research Associate at the centre, Dr Nico Avenant, Research Associate at the centre and Head: Mammalogy Department, National Museum, Prof. Maitland Seaman, Director of the Centre for Environmental Management, Dr Alex Weaver, Former Research Associate: Council for Scientific and Industrial Research (CSIR) and Dr Pieter Zietsman, Research Associate at the centre and Head: Botany Department, National Museum.

needs of the developing discipline of environmental management as practised in southern Africa.

Circumstances have changed. There is the growing importance of water, conservation is no longer only the domain of environmentalists, and environmental assessment has become more sophisticated. Environmental management systems are required in all but the smallest businesses, sustainability science has become established as its own discipline, and Africa needs to move beyond irrational exploitation toward cultural maturity.

Dr Alex Weaver was the guest speaker at the centre's 14<sup>th</sup> Year Celebration. He is a former Research Fellow in the Natural Resources and the Environment Division of the Council for Scientific and Industrial Research (CSIR) and he leads a sustainability science research group. Dr Weaver, as guest speaker, took part in the discussions to make sure that the master's programme covers all the necessary aspects. Among the many offices he has held, he

is a past president of the International Association for Impact Assessment, and he has been very influential in the development of environmental management at the CSIR and in southern Africa, having advised various universities on their environmental programmes. The discussions were very fruitful and the centre was given a good idea of what needs to be explored in the future to remain competitive.

Approximately 50 lecturers are involved in the programme, half of whom are contracted in from government and the private sector, for their specific competence.

In 2008 six students were registered for their Ph.D. degrees. During the April 2008 graduation ceremony, Ms Karissa Scott received the BloemWater Prize for the Best Master's Student in Environmental Management. Dr Limpho Letsela received her doctorate during the September 2008 graduation ceremony.

The centre has a cooperation agreement with the Katholieke Universiteit Leuven, Belgium, to

conduct research on temporary water ecology. In terms of this agreement, a Ph.D. and two M.Sc. students from Leuven spent time working at the centre in 2008, on studies initiated by the centre.

Through the motivation of the centre, the National Research Foundation (NRF) awarded a Research Niche Area in Integrated Water Resources Management to the UFS. This niche area forms part of the UFS's Strategic Cluster Initiative and the research focuses on Water Management in Water Scarce Areas. Prof. Seaman is the interim coordinator of the Cluster. Bursaries for postgraduate students form part of this grant from the NRF.

Under the umbrella of the Water Cluster, the first annual Orange River Basin Symposium was held by the UFS from 12-13 November 2008. The theme for the first symposium was *The Orange River Basin – The Resource*.

Staff of the centre attended a range of conferences in 2008. Prof. Seaman presented a paper *The Orange River Basin as field of water-related training and study at the University of the Free State, South Africa* at a session of the Universities Partnership in Transboundary Water at a World Water Congress in Montpellier, France. He also attended the World Water Week in Stockholm, Sweden. Ms Marthie Kemp attended the 51<sup>st</sup> Annual Symposium of the International Association for Vegetation Science in Stellenbosch from 7-12 September 2008. A total number of 251 participants from 37 countries attended the symposium. The main focus of the symposium was the link between vegetation science and evolutionary research. The programme included three parallel sessions, two poster sessions and a mid-week excursion.

Ms Linda Rossouw, a Ph.D. student of the centre, presented a paper at the 28<sup>th</sup> International Symposium of the North American Lake Management Society in Alberta, Canada from 11-14 November 2008. The title of the paper was *Environmental water requirements: Determining water*

*Ms Louise Zietsman from the centre, identifying macro-invertebrates for the South African Scoring System at Sepane Spruit, Free State Province.*

*quality required in non-perennial river systems, South Africa.*

Ms Nolene Morris, Chief Executive of BloemWater, officially opened the symposium and Dr Anthony Turton (former Natural Resource and Environment Unit Fellow: CSIR) was the keynote speaker. Various staff members of the centre delivered papers at the symposium.

Several projects and much fieldwork were carried out by the centre. Biomonitoring reports are provided by the centre to BloemWater for the Modder River and associated rivers. Two sites are monitored on the Caledon, thirteen sites on the Modder River and its important tributaries and two sites on the Riet River.

The centre is involved in a project with the Water Research Commission (WRC) to establish the environmental water requirements for non-perennial rivers. The South African National Water Act requires that the environmental reserve be determined for each significant water body before licenses may be issued. Methods currently available for the determination of environmental water requirements in South Africa are based on perennial rivers. Initially, the suitability of existing methods was determined through a series of desktop case studies. These case studies enable the researchers to identify gaps in knowledge, and hence the research needs to be identified.

Once this has been done, the next step is to modify or develop methods to meet these needs. At all stages this research has been interdisciplinary, with experts from the field making a major input



into each stage of the process. Important contributions in this regard have come from team members at Rhodes University, University of Cape Town, the CSIR and the UFS.

Communication of all phases of the work throughout the region is seen as crucial to its success. To this end, a communication strategy has been developed that will ensure that all interested parties know what is being done and are able to make appropriate input into the process as it proceeds.

The centre has been contracted to assist in developing an intervention plan for the National Grassland Biodiversity Programme, under the auspices of the South African National Biodiversity Institute (SANBI). This intervention plan, known as the *Free State River Ecosystem Project - the Koranna and Sepane Spruit in the Modder River Catchment Area*, was developed as a demonstration project to address biodiversity and river ecosystems services.

The centre also served the environmental community and the general public with numerous workshops through the year. ■

## Staff

**Director and BloemWater Chair:** Prof. Maitland Seaman

**Senior Lecturer:** Dr Jan Roos

**Lecturer:** Ms Marinda Avenant

**Associated Researchers:** Drs Ziets Zietsman, James Brink, Nico Avenant, Daan Toerien

**Course Co-ordinator:** Ms Marthie Kemp

**Senior Professional Officer:** Ms Marie Watson (Macro-invertebrates)

**Professional Officers:** Mss Marilie Carstens (GIS), Eloise Lambrecht (Macro-invertebrates), Tascha Vos (Water Quality and Algae), Ansophi van der Merwe (Ecology), Dr Limpho Letsela (Sociology), Ms Louise Zietsman (Macro-invertebrates) Bettie Phillips (Finance), Sanet Neethling (Marketing) and Messrs Jurie du Plessis (Fish), Juan Potgieter (Fish)

**Messenger:** Ms Evodia Khalata

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# Research outputs

## Research articles

**Avenant, N.L. & Du Plessis, J.J.** 2008. Sustainable small stock farming and ecosystem conservation in southern Africa: A role for small mammals? *Mammalia* 72: 258-263.

**Avenant, N.L., Watson, J.P. & Schulze, E.** 2008. Correlating small mammal community characteristics and habitat integrity in the Caledon Nature Reserve, South Africa. *Mammalia* 72: 186-191.

**Vanschoenwinkel, B., Gielen, S., Seaman, M. & Brendonck, L.** 2008. Any way the wind blows: Frequent wind dispersal drives species sorting in ephemeral aquatic communities. *Oikos* 117: 125-134.

**Vanschoenwinkel, B., Gielen, S., Vandewaerde, H., Seaman, M.T. & Brendonck, L.** 2008. Relative importance of different dispersal vectors for small aquatic invertebrates in a rock pool metacommunity. *Ecography* 31: 567-577.

## Reports

**Carstens, M. & Lamprecht, E.** 2008. *Survey of stream ecology and general landscape along the R712 between the koppie at Weltevrede and Sterkfontein Dam Nature Reserve.* Report to Terraworks, Bloemfontein, South Africa.

**Seaman, M.T., Roos, J.C., Watson, M. & Vos, A.T.** 2008. *State of the Modder River, Second term 2008 – A biomonitoring report.* Report to Bloem Water, Bloemfontein, South Africa.

**Seaman, M.T., Roos, J.C., Watson, M. & Vos, A.T.** 2008. *State of the Modder River, First term 2008 – A biomonitoring report.* Report to Bloem Water, Bloemfontein, South Africa.

**Seaman, M.T., Roos, J.C., Watson, M., Avenant, M.F., Vos, A.T. & Du Plessis, J.J.** 2008. *State of the Modder River, Third term 2008 – A biomonitoring report.* Report to Bloem Water, Bloemfontein, South Africa.

**Seaman, M.T., Watson, M., Avenant, M.F., Vos, A.T. & Du Plessis, J.J.** 2008. *State of the Modder River 2006 to 2008 – A biomonitoring report.* Report to Bloem Water, Bloemfontein, South Africa.

## Conference contributions

**Avenant, M.F.** 2008. *Environmental water assessments in non-perennial rivers.* Paper presented at the 1<sup>st</sup>

Annual Orange River Basin Symposium, University of the Free State, Centre for Environmental Management, Bloemfontein, South Africa. 12-13 November.

**Avenant, N.L. & Du Plessis, J.J.** 2008. *Effective small mammal sampling and its implications for wildlife management.* Poster presented at the Southern African Wildlife Management Association (SAWMA) Conference: Biodiversity Conservation, the Science Management Interface, Mpekweni Beach Resort, Port Alfred, South Africa. 16-19 September.

**Carstens, M.** 2008. *Using remote sensing to observe the extent of water in the Seekoei River, A tributary of the Orange River.* Paper presented at the 1<sup>st</sup> Annual Orange River Basin Symposium, University of the Free State, Centre for Environmental Management, Bloemfontein, South Africa. 12-13 November.

**Du Plessis, J.J. & Avenant, N.L.** 2008. *A review of information on the ecology of black-backed jackal Canis mesomelas and caracal Caracal caracal to facilitate in the management of these two damage-causing animals in the livestock and wildlife ranching industries in South Africa.* Paper presented at the Southern African Wildlife Management Association (SAWMA) Conference: Biodiversity Conservation, the Science Management Interface, Mpekweni Beach Resort, Port Alfred, South Africa. 16-19 September.

**Lamprecht, E.** 2008. *Data extrapolation from macroinvertebrate communities in the Upper Orange River Catchment Area, South Africa. Is it viable?* Paper presented at the 1<sup>st</sup> Annual Orange River Basin Symposium, University of the Free State, Centre for Environmental Management, Bloemfontein, South Africa. 12-13 November.

**Letsela, L.** 2008. *Sustainability challenges of rural water supply in Lesotho.* Paper presented at the 1<sup>st</sup> Annual Orange River Basin Symposium, University of the Free State, Centre for Environmental Management, Bloemfontein, South Africa. 12-13 November.

**Potgieter, J.** 2008. *A Study of the fish community structure of a "closed system" reservoir.* Paper presented at the 1<sup>st</sup> Annual Orange River Basin Symposium, University of the Free State, Centre for Environmental Management, Bloemfontein, South Africa. 12-13 November.

**Roos, J.C.** 2008. *Water quality and eutrophication assessment of the Vaal River System.* Paper presented at the 1<sup>st</sup> Annual Orange River Basin Symposium, University of the Free State, Centre for Environmental Management, Bloemfontein, South Africa. 12-13 November.

**Rossouw, L. & Vos, A.T.** 2008. *Environmental water requirements: Determining water quality required in non-perennial river systems, South Africa.* Paper presented at the 28<sup>th</sup> International Symposium of the North American Lake Management Society, Château Lake Louise, Alberta, Canada. 11-14 November.

**Seaman, M.T.** 2008. *The Orange River Basin – Why it is important to us at the UFS.* Paper presented at the 1<sup>st</sup> Annual Orange River Basin Symposium, University of the Free State, Centre for Environmental Management, Bloemfontein, South Africa. 12-13 November.

**Seaman, M.T.** 2008. *The Orange River Basin as field of water-related training and study at the University of the Free State, South Africa.* Paper presented at the 13<sup>th</sup> World Water Congress: Session on Universities Partnership in Transboundary Waters, Montpellier, France. 1-4 September.

**Vos, A.T.** 2008. *Influence of flow and nutrients on algae (periphyton and phytoplankton) in the Modder River.* Paper presented at the 1<sup>st</sup> Annual Orange River Basin Symposium, University of the Free State, Centre for Environmental Management, Bloemfontein, South Africa. 12-13 November.

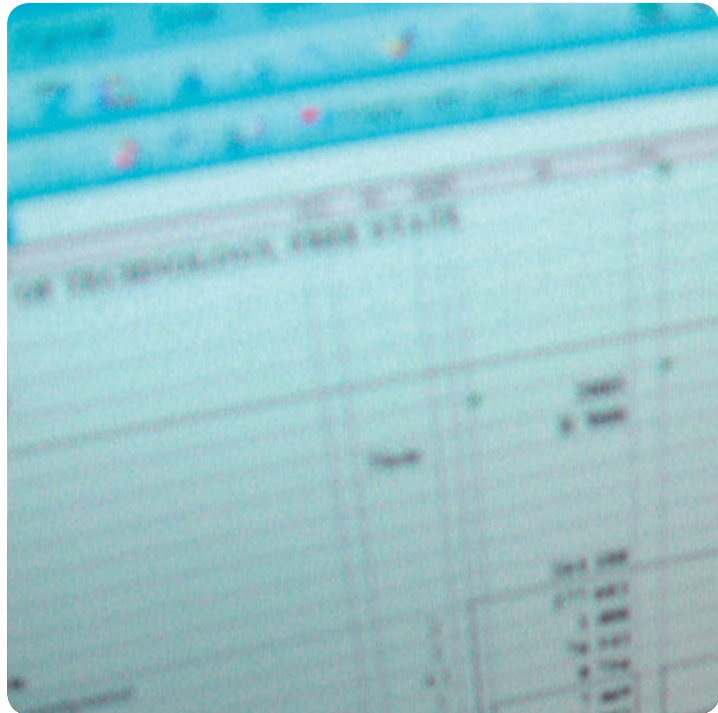
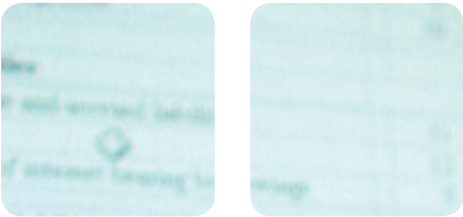
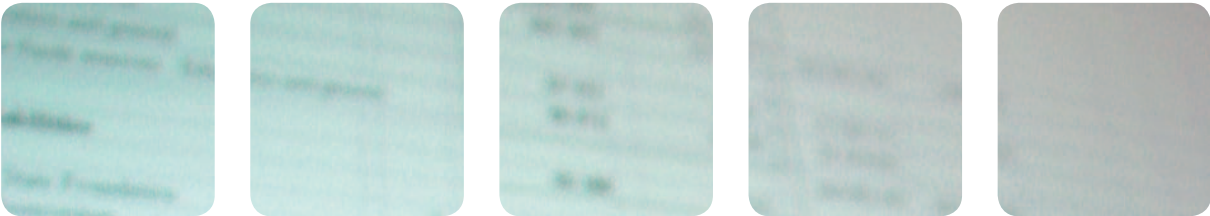
**Vos, A.T.** 2008. *The use of algae as index of water quality in non-perennial systems.* Paper presented at the 1<sup>st</sup> Annual Orange River Basin Symposium, University of the Free State, Centre for Environmental Management, Bloemfontein, South Africa. 12-13 November.

**Watson, M.** 2008. *Methodologies and invertebrates in the Orange River System.* Paper presented at the 1<sup>st</sup> Annual Orange River Basin Symposium, University of the Free State, Centre for Environmental Management, Bloemfontein, South Africa. 12-13 November.





# Statistical data

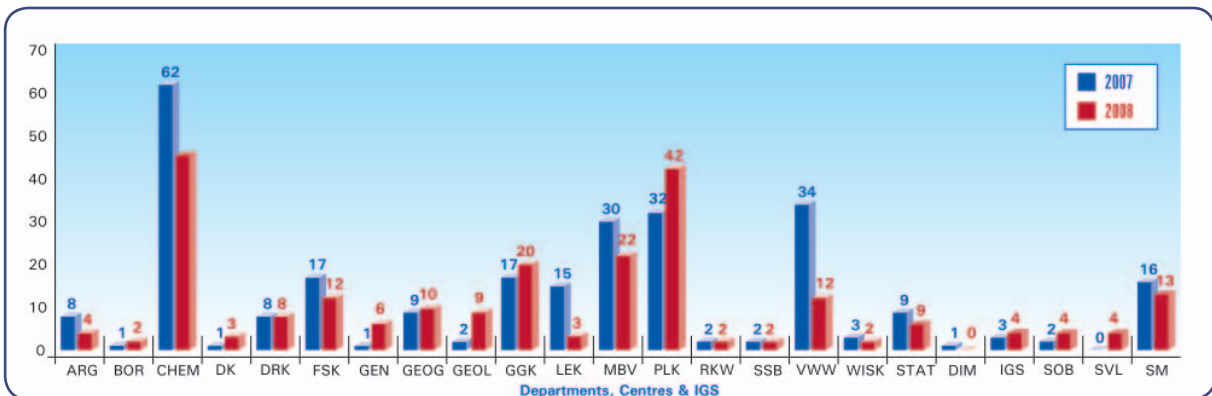


## Research outputs: 2007-2008

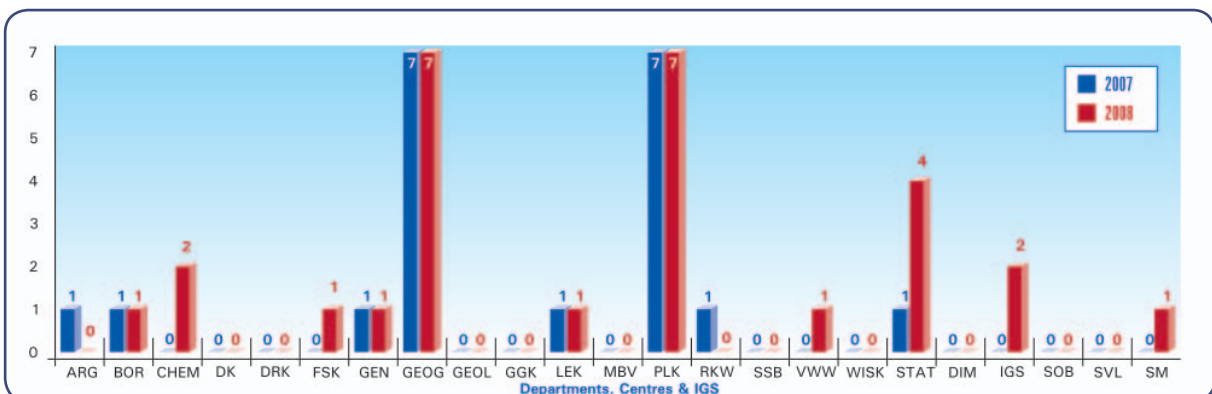
### List of abbreviations

Abbreviation	Name	Abbreviation	Name
ARG	Department of Architecture	GGK	Department of Soil, Crop and Climate Sciences
BOR	Department of Quantity Surveying and Construction Management	IGS	Institute for Groundwater Studies
SOB	Centre for Environmental Management	LEK	Department of Agricultural Economics
CEM	Department of Chemistry	MBV	Department of Microbial, Biochemical and Food Biotechnology
SM	Centre for Microscopy	PLK	Department of Plant Sciences
SVL	Centre for Sustainable Agriculture and Rural Development	RKW	Department of Computer Science and Informatics
DK	Dean's Office	SSB	Department of Urban and Regional Planning
DRK	Department of Zoology and Entomology	SRB	Disaster Management Training and Education Centre for Africa (DIMTEC)
FSK	Department of Physics	VWW	Department of Animal, Wildlife and Grassland Sciences
GEN	Department of Genetics	STAT	Department of Mathematical Statistics and Actuarial Science
GEOG	Department of Geography	WISK	Department of Mathematics and Applied Mathematics
GEOL	Department of Geology		

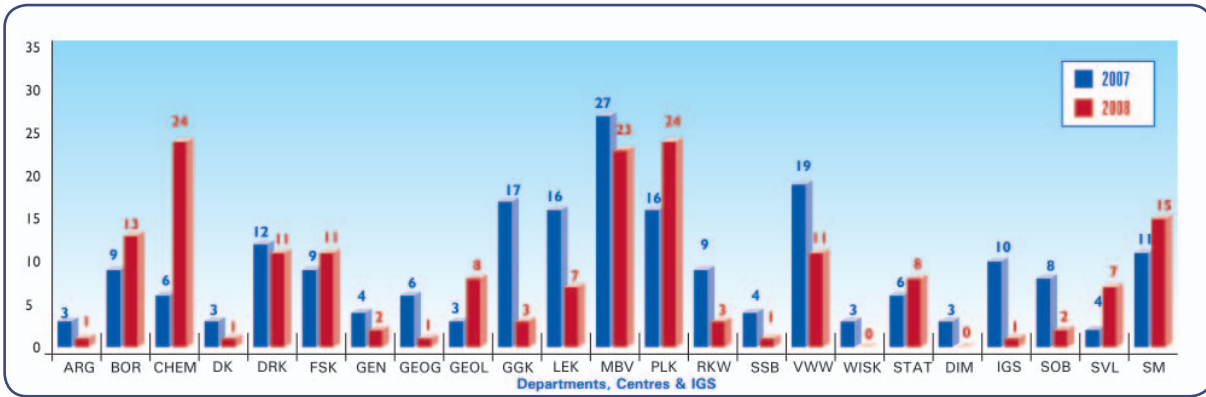
### Accredited articles



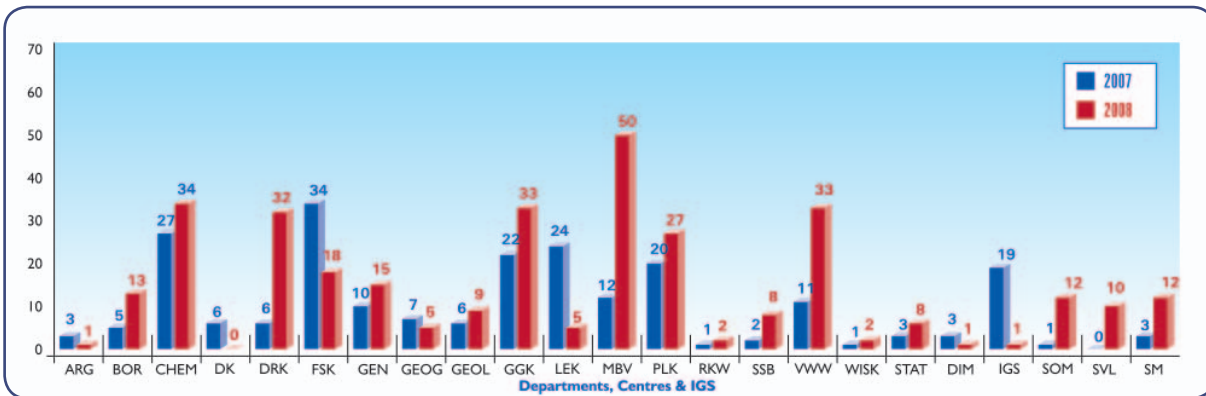
### Books



### International conferences



### Local conferences



## Student figures: 2007-2008

### Student figures

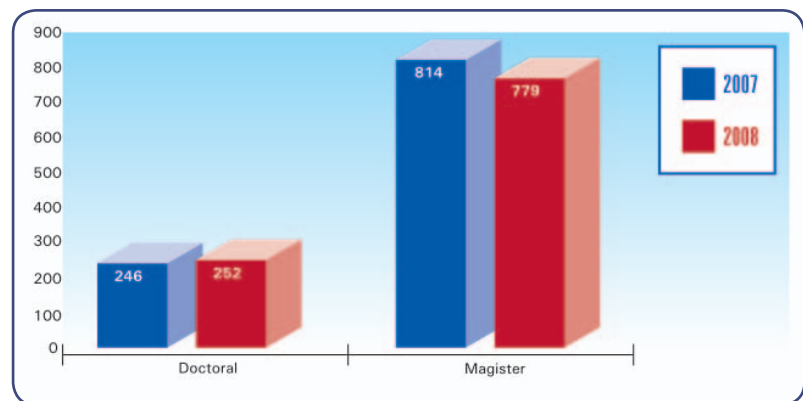
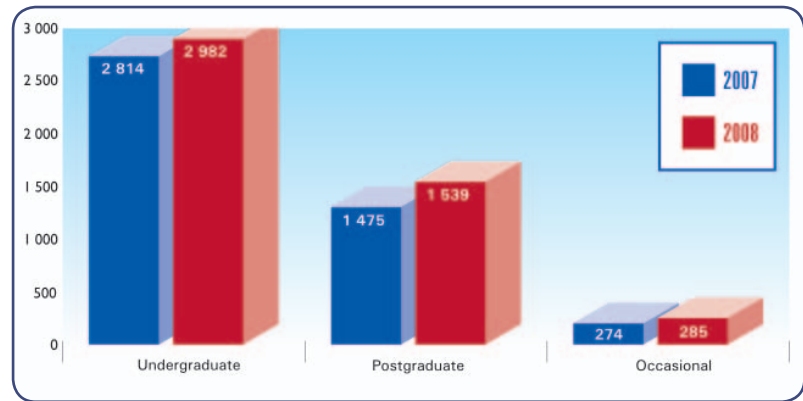
Year	Description	Black	Coloured	Asian	White	Total
2007	Undergraduate	1492	66	38	1218	2814
	Postgraduate	710	41	40	684	1475
	Occasional	230	6	2	36	274
<b>*TOTAL</b>		<b>2432</b>	<b>113</b>	<b>80</b>	<b>1938</b>	<b>4563</b>
2008	Undergraduate	1667	51	37	1227	2982
	Postgraduate	755	40	43	701	1539
	Occasional	260	5	1	19	285
<b>* TOTAL</b>		<b>2682</b>	<b>96</b>	<b>81</b>	<b>1947</b>	<b>4806</b>

### International students

Nationality	Year	Year
	2007	*2008
Angola	2	0
Asian countries	20	24
Botswana	17	23
Democratic Republic of the Congo	0	1
European countries	9	10
Lesotho	118	144
Malawi	3	5
Mauritius	2	3
Mozambique	4	7
Namibia	54	65
North America	15	5
Other African countries	47	69
South America	1	0
Swaziland	5	6
Zambia	7	7
Zimbabwe	48	60
<b>Total</b>	<b>352</b>	<b>429</b>

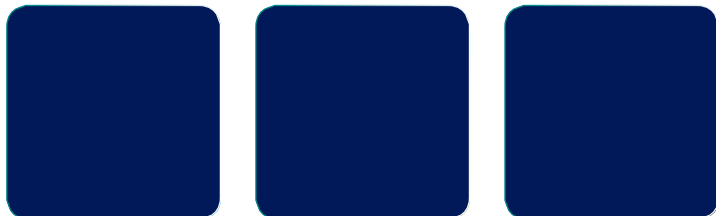
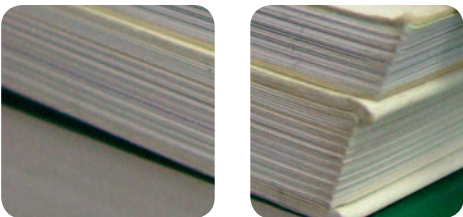
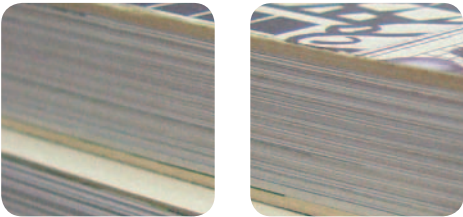
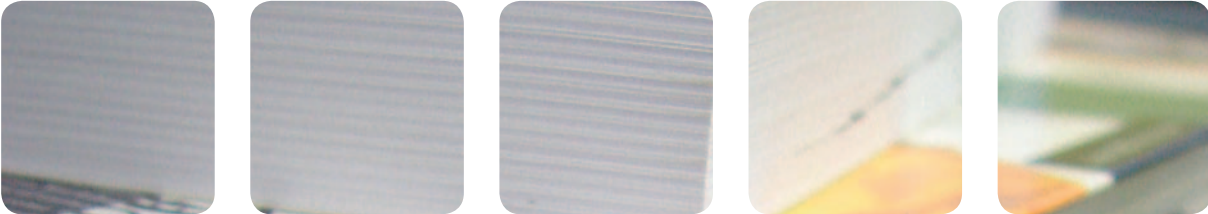
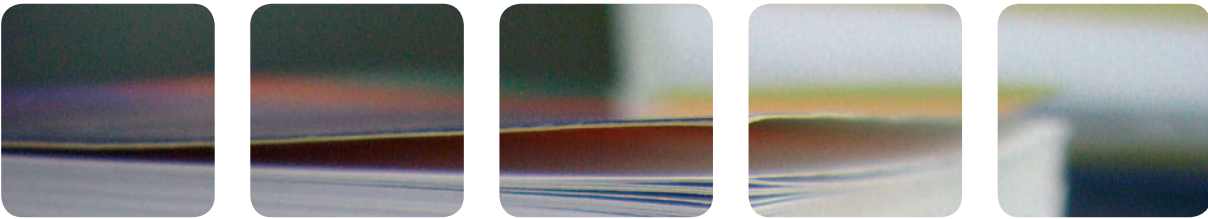
\*2008 Final HEMIS figures not available

### Comparison for the Faculty of Natural and Agricultural Sciences





# Glossary



## Glossary

### A

AACC -	American Association for Cereal Chemists
AACE -	Association for the Advancement of Cost Engineering
ADF -	Amsterdam Density Functional Programme
ADG -	Average Daily Grain
AEASA -	Agricultural Economics Association of South Africa
AEON -	the African Earth Observation Network
AGU -	American Geophysical Union
AI -	Artificial Insemination
ARC -	Agricultural Research Council
ARV -	Antiretroviral
ASC -	Architecture Student Conference
ASAQS -	Association of South African Quantity Surveyors
ASOCSA -	Association of Schools of Construction of Southern Africa

### B

BBSRC -	Biotechnology and Biological Sciences Research Council
BMBF -	Federal Ministry of Education and Research, Germany

### C

CAA -	Commonwealth Association of Architects
CANSA -	Cancer Association of South Africa
CAB -	Centro de Astrobiología
CED -	Centre for Education Development
CePHMa -	Centre for Plant Health Management
CHESD -	Centre for Higher Education Studies and Development
CHPC -	Centre for High Performance Computing
CIDB -	Construction Industry Development Board
CIOB-SA -	Chartered Institute of Building, South Africa
CSIR -	Council for Scientific and Industrial Research Organisation
CSTA -	Cereal Science and Technology Association
CUT -	Central University of Technology

### D

DiMTEC -	Disaster Management Training and Education Centre for Africa
DMISA -	Disaster Management Institute of Southern Africa
DRRW -	Durable Rust Resistance in Wheat
DST -	Department of Science and Technology
DWAF -	Department of Water Affairs and Forestry

### E

ECA -	European Crystallographic Association
EGIC -	Economic Growth and International Competitiveness
EMSA -	Environmental Management Systems Association
EMS -	Environmental Management Systems
EPWP -	Expanded Public Works Programme

### F

FAO -	Food and Agricultural Organisation
FETWater -	Framework Programme for Research Education and Training in Water
FMP -	Facilities Management Programme
FSRDPP -	Free State Rural Development Partnership Project
FTIR -	Fourier Transform Infra Red Spectrometer

### G

FGAP -	Facility for Genomics and Proteomics
GIS -	Geographical Information Systems
GMO -	Genetically Modified Organisms
GRDM -	Groundwater Resource Directed Measures
GSSA -	Grassland Science Society of South Africa
GSSA -	Geological Society of South Africa

### H

HCI -	Human-computer Interaction
HRTEM -	High Resolution Transmission Electron Microscopy

### I

IAMA -	International Food and Agribusiness Management Association
IAU -	International Astronomical Union
ICACS -	International Conference on Atomic Collisions in Solids
ICCC -	International Conference on Coordination Chemistry
ICEC -	International Cost Engineering Council
ICRISAT -	International Crops Research Institute for the Semi-Arid Tropics
ICSU -	International Council for Science
IDC -	Industrial Development Corporation
IGC -	International Geological Congress
IGS -	Institute for Groundwater Studies
IMWA -	International Mine Water Association
INCRoP -	Insects on New Crops Programme
IPMP -	Intensive Project Management Programme
ISI -	International Statistical Institute
ISME -	International Society for Microbial Ecology
IT -	Information Technology
IUMS -	International Union of Microbiological Societies

### L

LPI -	Lunar and Planetary Institute
LRAD -	Land Redistribution for Agricultural Development

### M

MCEE -	Minnesota Council on Economic Education
MDC -	Maputo Development Corridor
MEC -	Member of the Executive Council
MNS -	Material and Nanosciences Cluster
MOU -	Memorandum of Understanding
MRC -	Medical Research Council
MSA -	Masters in Sustainable Agriculture
MSSA -	Microscopy Society of Southern Africa
MUCPP -	Mangaung University Community Partnership Programme

**N**

NAMC -	National Agricultural Marketing Council
NASA -	National Aeronautics and Space Administration
NASSP -	National Astrophysics and Space Science Programme
NBN -	National Bioinformatics Network
NCEE -	National Council for Economic Education
NDF -	Neutral Detergent Fibre
NECSA -	Nuclear Energy Corporation of South Africa
NERPO -	National Emergent Red Meat Producers Organisation
NGO -	Non-Governmental Organisation
NRF -	National Research Foundation
NSTF -	National Science and Technology Forum
NWGA -	National Wool Growers' Association

**O**

OECD -	Organisation for Economic Cooperation and Development
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**P**

PAQS -	Pacific Association of Quantity Surveyors
PDMS -	Provincial Disaster Management Centre
PRT -	Protein Research Trust

**R**

RDP -	Redress and Development Programme
RIBA -	Royal Institute of British Architects
RICS -	Royal Institute of Chartered Surveyors
RIEP -	Research Institute of Education Planning
RMMA -	Red Meat Abattoirs Association
RPO -	Red Meat Producers Organisation
RTPI -	Royal Town Planning Institute

**S**

SA -	South Africa
SAAPMB -	South African Association of Physicists in Medicine and Biology
SAB -	South African Breweries Limited

SABC -	South African Broadcasting Corporation
SACAP -	South African Council for the Architectural Professions
SACPCMP -	South African Council for the Property Valuers Profession
SACPLAN -	South African Council of Planners
SACQSP -	South African Council for the Quantity Surveying Profession
SADC -	Southern African Development Community
SAFA -	South African Feedlot Association
SAFEFE -	South African Foundation for Economic and Financial Education
SAFOI -	South African Fryer Oil Initiative
SAIA -	South African Institute of Architects
SAIM -	Society for Industrial and Applied Mathematics
SAISC -	Southern African Institute of Steel Construction
SANBI -	South African National Biodiversity Institute
SANCID -	South African Commission on Irrigation and Drainage
SANPAD -	South African Netherlands Research Programme on Alternatives in Development
SANSA -	South African National Survey of Arachnida
SAPOA -	South African Property Owners Association
SAPPS -	Symposium of the South African Pecan Producers Association
SAQA -	South African Qualifications Authority
SASA -	South African Statistical Association
SASHS -	Southern African Society for Horticultural Sciences
SASM -	South African Society for Microbiology
SAWMA -	South African Wildlife Management Association
SAWSS -	Southern African Weed Science Society
SCM -	Scientific Computing and Modeling
SEG -	Society of Economic Geologists
SEM -	Scanning Electron Microscope

SLE -	Senior Lecturer Equivalent
SSSSA -	Soil Science Society of South Africa
SWMA -	Southern African Wildlife Management Association

**T**

TEM -	Transmission Electron Microscope
THRIP -	Technology and Human Resource for Industry Programme

**U**

UCT -	University of Cape Town
UEC -	Unit for Earth Construction
UFS -	University of the Free State
UJ -	University of Johannesburg
UK -	United Kingdom
UN -	United Nations
UNESCO -	United Nations Educational, Scientific and Cultural Organisation
UNU -	United Nations University
UP -	University of Pretoria
USA -	United States of America
USAID -	United States Agency for International Development
UWC -	University of the Western Cape

**W**

WCAP -	World Conference on Animal Production
WITS -	University of the Witwatersrand
WRC -	Water Research Commission

