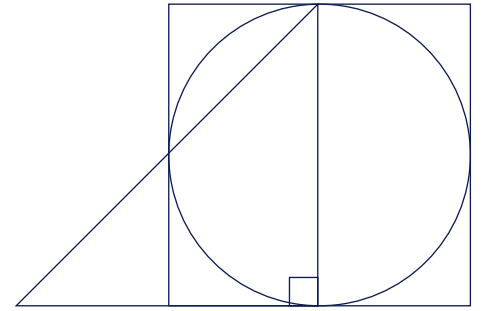


Report

05/06



Faculty of Natural and Agricultural Sciences



Faculty of Natural and Agricultural Sciences

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From the Dean's office



Prof. Herman van Schalkwyk.

The Faculty of Natural and Agricultural Sciences at the University of the Free State (UFS) leads the way in the practising of natural and agricultural sciences in South Africa and the highest levels of quality and credibility are reflected.

Our commitment, however, reaches far beyond just this. It reaches beyond the borders of the country and across continents; its multi-disciplinary and practical approach is vested in all the disciplines presented by the faculty.

In 2005/06 the Faculty experienced significant growth in measurable outputs. A contributing factor was the comprehensive apparatus strategy and plan which was implemented in 2005. With this strategy, university funds were used to leverage other funds in order to obtain huge discounts from suppliers of apparatus. In this way the faculty managed to obtain almost R50 million worth of apparatus in 2005.

The strategy was continued in 2006 when an agreement to the value of R7 542 531 was reached with Shimadzu, according to which apparatus was supplied to the faculty at discount prices. The agreement, which is valid for three years, entails the free replacement of apparatus which is purchased during this period with upgraded versions.

The new apparatus forms part of the UFS vision to compete internationally with quality research outputs in certain niche areas, to provide leadership in advanced training to students from the African continent and to establish the university as a leader among South African universities.

Two researchers with a B rating from the National Research Foundation (NRF) were also appointed. Both of these initiatives bore fruit and in 2006 the faculty increased its total research outputs by

about 13%. As an example, the Department of Chemistry's outputs increased by 100%.

The faculty has been bursting at the seams over the past couple of years. Student figures rose from 3 935 undergraduate, postgraduate and occasional students in 2005, to 4 224 in 2006. There is also strong representivity of students from other African countries and in 2005/06 almost 600 students studied at the faculty.

An extended B.Sc. programme has been presented to students since 2005. The programme aims at providing students who do not comply with all the requirements for the B.Sc. programme with the necessary sub-structure to complete the B.Sc. degree successfully. A preliminary evaluation of the results indicates that the programme is delivering the desired results.

The alignment of the Qwaqwa Campus, which was incorporated into the UFS in January 2003, remains a challenge. Regular discussions are held with staff on the campus in order to make the faculty's programmes more sustainable and to align it with the broader strategic plan of the UFS.

On a national level, the faculty is in the process of making its mark in terms of teaching and community service. In 2005 the faculty again actively began utilising its

experimental farms. A three-way agreement between the UFS, the National Farmers Union (NAFU) and the Mangaung Local Municipality led to the establishment of the Lengau Agricultural Development Centre on the Sydenham Experimental Farm. The centre provides training and mentorship to small-scale upcoming farmers.

To be dynamic and progressive requires innovative thinking. It requires commitment and a desire to deliver excellent teaching and learning opportunities to students. It requires a willingness to form partnerships, and a multi-disciplinary and practical approach to the tertiary education environment in South Africa.

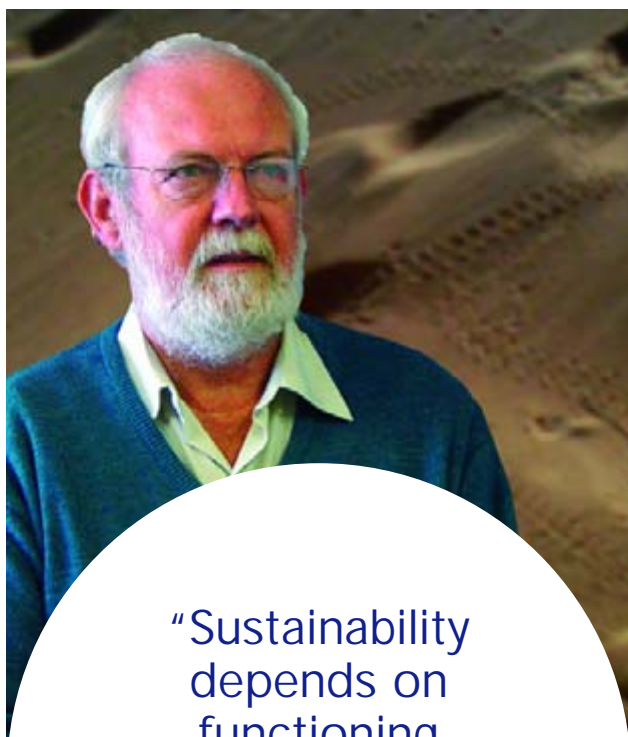
This report covers the faculty's activities in 2005/06. It is a reflection of two years' commitment on the part of a team of skilled and motivated academics and support staff.



Prof. Herman van Schalkwyk

Dean: Faculty of Natural and Agricultural Sciences
University of the Free State

Environmental Management



“Sustainability depends on functioning environmental services.”

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, so much so that other universities have either copied its name or taken over the framework of its master's programme in Environmental Management. The niche is based on three intertwined components, namely the master's and doctoral programmes, a research component, and short courses.

The centre, with Prof. Maitland Seaman as Director, is now a recognised 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 business. Prof. Seaman is also the incumbent of the BloemWater Chair in Water Environmental Management.

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. Graduates are in demand by large companies, local authorities and nature conservation bodies.

The master's programme developed gradually and 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 inextricably woven.

From about 100 applicants, the master's programme takes in about 40 students annually. The intake increases in diversity every year. In 2005/06 most of the students were from the Southern African Development Community (SADC), and a few 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 in Bloemfontein, split into one session per semester.

“Research at the centre is based on water environmental management, which also forms an important part of the master’s programme.”

Approximately 50 lecturers are used for presenting classes, half of whom are contracted in from government and the private sector because of their competence in specialist practice within the broad field of environmental management.

In both 2005 and 2006 seven students were registered for their Ph.D. degrees respectively. In 2005 Mr Harold van Niekerk, completed his studies with a thesis on: *Microbiological monitoring of freshwater systems in South Africa*. Mr. Peter Kuyler completed his studies in 2006 with a thesis on: *Application of multi-criteria analysis in land use decisions*. In Both 2005 and 2006 another three full-time students were funded by the centre from contract income respectively.

The centre also signed a co-operative agreement with the Catholic University of Leuven in 2005 to conduct research on temporary water ecology.

Research in the centre is based on water environmental management, which also forms an important part of the master’s programme. While the centre has a number of

research contracts and appointments, its anchor contract is with BloemWater to bio-monitor the Modder and associated rivers, forming an important contribution to the national River Health Programme. The study, which started in 1998, is probably the most comprehensive study providing the longest and broadest data base of any river health programme study in the country. The team on this study covers the geomorphology, riparian vegetation, water quality, algae, invertebrates and fish, ensuring that a broad base of expertise is built up.

The centre has also been contracted by the Water Research Commission (WRC) to examine the environmental water requirements in non-perennial systems as an ultimate basis for water allocation in the drier half of South Africa. The team for this project is mainly from the UFS, with contributions from the Council for Scientific and Industrial Research (CSIR), the University of Cape Town and Rhodes University.

The centre is involved with various projects of intensive bio-monitoring of water bodies



Above
Fish sampling in the Seekoei River as part of the study of Environmental Water Requirements on non-perennial systems.

Right
Determining the present ecological state of the Koranna Stream using macroinvertebrates and habitat assessment.

in the Southern Free State, notably the Modder, Riet and Caledon Rivers, as well as various dams and pans. It is also directly involved in water-quality monitoring of treated water in the Free State and Eastern Cape. The centre is therefore intimately involved in integrated water resources management and training for the community it serves.

A series of short courses for the Manguang Local Municipality on environmental management was presented during 2006. Prof. Seaman was appointed as a trustee of the Lesotho Bio-diversity Trust in the same year.

Through the motivation of the centre, the National Research Foundation (NRF) awarded the UFS a research niche area in Integrated Water Resources Management. This niche area forms part of the university's Strategic Cluster Initiative and the research will focus on Water Management in Water Scarce Areas. Prof. Seaman is the convenor of the cluster. Bursaries for master's and doctoral students form part of this grant from the NRF.

Academic staff

Director: Prof. Maitland Seaman

Senior Lecturer: Dr Jan Roos

Lecturer: Ms Marinda Avenant

Senior Professional Officer: Ms Marie Watson

Professional Officers: Mss Limpho Letsela, Tascha Vos, Eloise Lamprecht, Marilie Carstens, Messrs Jurie du Plessis, Ockie Scholtz

Associated Researchers: Drs. Pieter Zietsman, James Brink, Nico Avenant

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Ms Marie Watson, Senior Professional Officer at the centre, identifying invertebrates at the Seekoei River.



Ms Marinda Avenant, Lecturer at the department and Mr Jurie du Plessis, Academic Assistant, measuring and identifying the catchments at the Modder River.

Research outputs

Research articles

Vos, A.T. & Roos, J.C. 2005. Causes and consequences of algal blooms in Loch Logan, an urban impoundment. *Water SA* 31: 385-392.

Vos, A.T. & Roos, J.C. 2005. Causes and consequences of algal blooms in Loch Logan, an urban impoundment. *International Water & Irrigation* 25(3): 28-30.

Research Reports

Roos, J.C. 2005. *Waterkwaliteit assessering: Woonbuurt se reinigingswerke (Mafube/Frankfort distrik)*. Report to Mr Andre Swart, Agritrans CC, Paisley Farm, Frankfort, South Africa.

Roos, J.C. 2006. *Water quality study*. Report to Kwezi V3 Engineers and the Sol Plaatjie Municipality, South Africa.

Rossouw, L., Avenant, M.F., King, J.M., Barker, C.H., Du Preez, P.J., Pelsler, A., Roos, J.C., Van Staden, J.J., Van Tonder, G.J. & Watson, M. 2005. *Environmental water requirements in non-perennial systems*. Report to the Water Research Commission, WRC Report No. 1414/1/05.

Seaman, M.T. & Watson, M. 2006. *Ecological implications of siltation in the Caledon River upstream and downstream of Welbedacht Dam*. Report to Ninham Shand and BloemWater, South Africa.

Seaman, M.T. & Watson, M. 2006. *State of the environment for Cacadu Municipal District (excluding the Nelson Mandela Metropole)*. Report to the Cacadu District Municipality, South Africa.

Seaman, M.T., Roos, J.C., Watson, M., Avenant, M.F. & Vos, A.T. 2005. *State of the Modder River: 2003 – 2005*. A Quarterly Bio-monitoring Report to BloemWater, South Africa.

Seaman, M.T., Roos, J.C., Watson, M., Avenant, M.F., Barker, C., Du Preez, P.J. & Vos, A.T. 2005. *State of the Modder River*. A Quarterly Bio-monitoring Report to BloemWater, South Africa.

Seaman, M.T., Roos, J.C., Watson, M., Du Preez, P.J. & Vos, A.T. 2006. *State of the Modder River*. A Quarterly Bio-monitoring Report to BloemWater, South Africa.

Swart, V.R. 2006. *Situation analysis of the Orange River water quality utilized for irrigation*

at Rotondo Walnuts, based on samples taken on 28 August 2006. Report to Rotondo Walnuts, South Africa.

Vermeulen, D. & Roos, J.C. 2005. *Short review on water quality in Sterkspruit area*. Report to BloemWater, South Africa.

Conference contributions

Avenant, M.F. 2005. *Fish as bio-indicators in a regulated non-perennial river*. Paper presented at the 32nd Conference of the Zoology Society of Southern Africa, Department of Zoology and Entomology, Rhodes University, Grahamstown, South Africa.

Avenant, M.F., Rossouw, L., Seaman, M.T. & King, J.M. 2005. *Environmental water requirements in non-perennial river systems*. Paper presented at the 32nd Conference of the Zoology Society of Southern Africa, Department of Zoology and Entomology, Rhodes University, Grahamstown, South Africa.

Du Plessis, J.J. & Avenant, M.F. 2005. *Die belangrikheid van droë-seisoen poele in funksionering as toevlugsoord vir visse in 'n nie-standhoudende rivier in die Vrystaat, Suid Afrika*. Paper presented at the 11th Annual Conference of the International Association for Impact Assessment, South African Affiliate, Thaba 'Nchu Sun, South Africa.

Du Plessis, J.J. & Avenant, M.F. 2005. *Fish as bio-indicators in a regulated non-perennial river*. Paper presented at the 32nd Conference of the Zoology Society of Southern Africa, Department of Zoology and Entomology, Rhodes University, Grahamstown, South Africa.

Du Plessis, J.J. & Avenant, M.F. 2006. *The role of a dry-season pool as refuge for fish in a non-perennial river in the Free State, South Africa*. Poster presented at the South African Association of Aquatic Scientists Conference, Pestana Rovuma Hotel, Maputo, Mozambique.

Kaiser, W. & Avenant, N.L. 2006. *The importance of including rodents in veld condition assessments: A case study*. Paper presented at the International Conference on Rodent Biology and Management (ICRBM3), Hanoi, Vietnam.

Mellett, R. & Barker, C. 2005. *Management and geomorphological processes of a highly regulated*

river system: The Bloemspruit, Free State, South Africa. Paper presented at the 11th Annual Conference of the International Association for Impact Assessment, South African Affiliate, Thaba 'Nchu Sun, South Africa.

Roos, J.C. & Vos, A.T. 2006. *Sediment quality and water interaction in Kamfers Dam, A saltpan, Kimberley*. Poster presented at the South African Association of Aquatic Scientists Conference, Pestana Rovuma Hotel, Maputo, Mozambique.

Scott, K. & Watson, M. 2005. *A biomonitoring study of a regulated river with specific reference to the Bloemspruit, Free State, South Africa*. Paper presented at the 11th Annual Conference of the International Association for Impact Assessment, South African Affiliate, Thaba 'Nchu Sun, South Africa.

Seaman, M.T., Avenant, M.F., Rossouw, L. & King, J.M. 2005. *Environmental water requirements in non-perennial systems*. Paper presented at the Water Research Fund of Southern Africa (WARFSA) Conference, Mbabane, Swaziland.

Vanschoenwinkel, B., Seaman, M.T. & Brendonck, L. 2006. *Linking community patterns with dispersal in a rock pool metacommunity*. Paper presented at the Workshop on Experimental Meta-populations in Evolutionary Biology, Montpellier, France.

Vos, A.T. & Roos, J.C. 2005. *In-lake nutrient management of Loch Logan: An urban impoundment*. Paper presented at the 11th Annual Conference of the International Association for Impact Assessment, South African Affiliate, Thaba 'Nchu Sun, South Africa.

Watson, M. 2005. *Assessment of a tool used in the determination of the ecological water requirement of a regulated river*. Poster presented at the 32nd Conference of the Zoology Society of Southern Africa, Department of Zoology and Entomology, Rhodes University, Grahamstown, South Africa.

Watson, M. 2006. *Invertebrates in a non-perennial river*. Poster presented at the South African Association of Aquatic Scientists Conference, Pestana Rovuma Hotel, Maputo, Mozambique.

Statistical data of the faculty

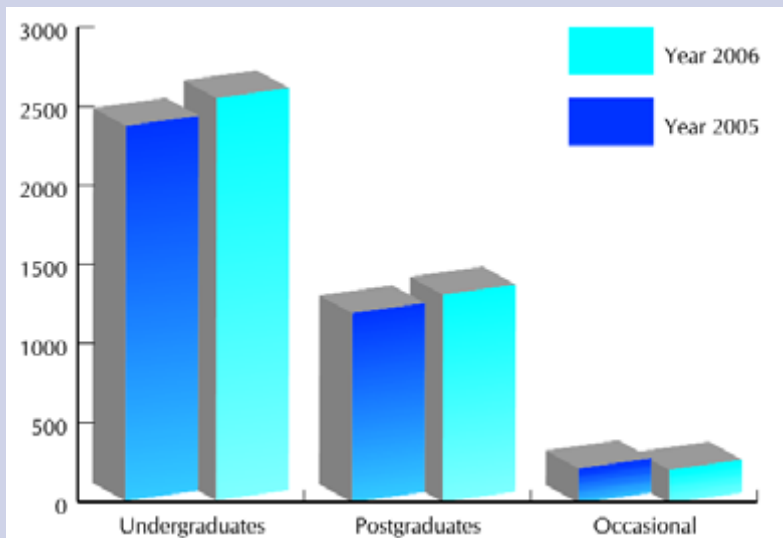


Student figures

Faculty of Natural and Agricultural Sciences, 2005/06

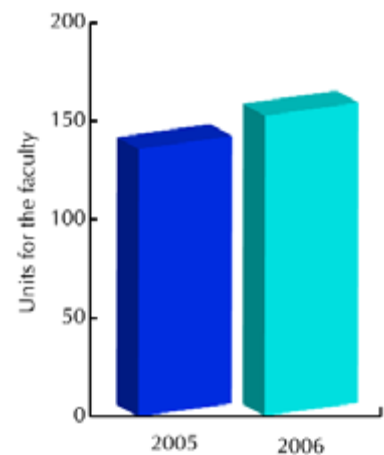
Male					
2005					
Description	African	Coloured	Indian	White	Total
Undergraduate	676	31	26	724	1457
Postgraduate	351	22	15	400	788
Occasional	84	3	4	17	108
Total 2005	1111	56	45	1141	2353
2006					
Description	African	Coloured	Indian	White	Total
Undergraduate	729	28	21	768	1546
Postgraduate	385	21	16	431	853
Occasional	68	2	2	23	95
Total 2006	1182	51	39	1222	2494
Female					
2005					
Description	African	Coloured	Indian	White	Total
Undergraduate	563	41	11	394	1009
Postgraduate	206	16	11	221	454
Occasional	101	5	2	11	119
Total 2005	870	62	24	626	1582
2006					
Description	African	Coloured	Indian	White	Total
Undergraduate	641	39	17	401	1098
Postgraduate	243	15	17	234	509
Occasional	103	2	2	16	123
Total 2006	987	56	36	651	1730
Total					
2005					
Description	African	Coloured	Indian	White	Total
Undergraduate	1239	72	37	1118	2466
Postgraduate	557	38	26	621	1242
Occasional	185	8	6	28	227
Total 2005	1981	118	69	1767	3935
2006					
Description	African	Coloured	Indian	White	Total
Undergraduate	1370	67	38	1169	2644
Postgraduate	628	36	33	665	1362
Occasional	171	4	4	39	218
Total 2006	2169	107	75	1873	4224

Student nationality		
Nationality	2005	2006
Angola	1	
Asian countries	21	18
Botswana	20	20
European countries	6	6
Lesotho	142	142
Malawi	2	1
Mauritius		2
Mozambique	8	7
Namibia	40	42
No information	1	
North America	4	4
Other Africa	45	48
South Africa	3610	3893
South America		1
Swaziland	13	13
Zambia	4	6
Zimbabwe	18	21
Total	3935	4224



Student figures

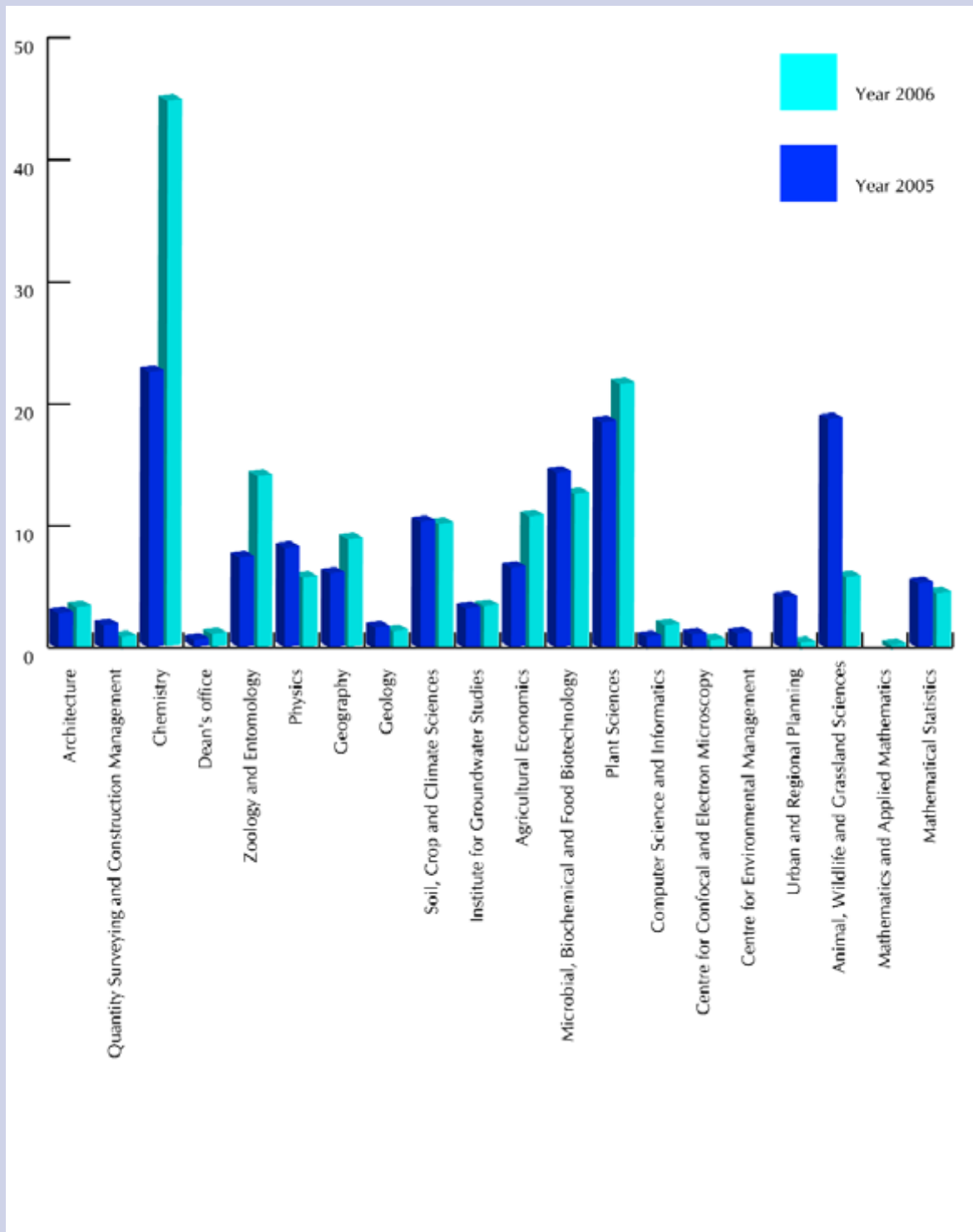
Research outputs for the Faculty of Natural and Agricultural Sciences



Articles published in accredited approved research journals.

Departmental research outputs

Articles published in accredited approved research journals, 2005/06



Glossary



Glossary

A

ACIAR	Australian Centre for International Agricultural Research
AEASA	Agricultural Economics Association of South Africa
ALPRU	African Large Predator Research Unit
ARC	Agricultural Research Council
ARMSCOR	Armaments Corporation of South Africa
ARS	Agri Risk Specialists
ASAQS	Association of South African Quantity Surveyors
ASSA	Anatomical Society of South Africa
ASTER	Advanced Spaceborne Thermal Emission and Reflection Radiometer
AVS	American Vacuum Society

C

CANSA	Cancer Association of South Africa
CATSA	Catalysis Society of South Africa
CBD	Convention of Biological Diversity
CCEM	Centre for Confocal and Electron Microscopy
CePHMa	Centre for Plant Health Management
CfPB	Centre for People and Buildings
CIAT	International Centre for Tropical Agriculture
CIDB	Construction Industry Development Board
CIMMYT	International Maize and Wheat Improvement Centre
CIOB	Chartered Institute of Building
CIOB-SA	Chartered Institute of Building - South Africa
CSACEE	Central South African Council on Economic Education
CSIC-INTA	Centro de Astrobiología
CSIR	Council for Scientific and Industrial Research
CSIRO	Commonwealth Scientific and Industrial Research Organisation

D

DEAT	Department of Environmental Affairs and Tourism
DiMTEC	Disaster Management Training and Education Centre for Africa
DMISA	Disaster Management Institute of South Africa
DST	Department of Science and Technology

E

EAAP	European Association for Animal Production
EASA	Education Association of South Africa
ECA	European Crystallographic Association
EIGG	Environmental Inorganic Geochemistry Group
EPWP	Expanded Public Works Programme
ESBES	European Symposium on Biochemical Engineering Science
ESREL	European Safety and Reliability
ESRP	Economic and Social Rehabilitation Programme

F

FAO	Food and Agriculture Organisation
FEMS	Federation of European Microbiological Societies
FMP	Facilities Management Programme
FOTIM	Foundation of Tertiary Institutions of the Northern Metropolis

FSRPO	Free State Red Meat Producers Organisation
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G

GIS	Geographical Information Systems
Glen ADI	Glen Agricultural Development Institute
GM	Genetically Modified
GMBA	Gauteng Master Builders' Association
GMO	Genetically Modified Organisms
GWK	Griekwaland-Wes Koöperasie

H

HIV	Human Immunodeficiency Virus
HPCSA	Health Professions Council of South Africa
HPLC	High Performance Liquid Chromatography
HSPCM	Health and Safety Programme for Construction Managers

I

IAGOD	International Association on the Genesis of Ore Deposits
IAH	International Association of Hydrogeologists
ICCC	International Conference on Coordination Chemistry
ICEC	International Cost Engineering Council
ICID	International Commission on Irrigation and Drainage
ICP	Inductively Coupled Plasma
ICRBM	International Conference on Rodent Biology and Management
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IDC	Industrial Development Corporation
IGS	Institute for Groundwater Studies
IITA	International Institute of Tropical Agriculture
INCRoP	Insects on New Crops Programme
INTSORMIL	International Sorghum and Millet Research Support Programme

IPMA

IPMA	International Project Management Association
IPMP	Intensive Project Management Programme
IRDP	Institutional Research and Development Programme
IRWH	In-field Rainwater Harvesting
IUCr	International Union of Crystallography
IUMS	International Union of Microbial Societies
IUPAP	International Union of Pure and Applied Physics

J

JFM	Journal of Facilities Management
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L

LExEn	Life in Extreme Environments
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M

MIRCHEN	Microbiological Resources Centre
MIT	Massachusetts Institute of Technology
MRM	Mineral Resource Management
MSA	Master's Degree in Sustainable Agriculture
MSSA	Microscopy Society of Southern Africa
MUCPP	Mangaung University Community Partnership Programme
MURP	Master's Degree in Urban and Regional Planning

N

NaCOF	National Climate Outlook Forum
NAFU	National African Farmers Union
NAMC	National Agricultural Marketing Council
NASA	National Aeronautics and Space Administration
NASSP	National Astrophysics and Space Science Programme
NCEE	National Council for Economic Education
NDA	National Department of Agriculture
NECSA	National Energy Commission of South Africa
NELSAM	Natural Earthquake Laboratory in South African Mines
NERPO	National Emergent Red Meat Producers' Organisation
NGO	Non-Governmental Organisation
NML	National Metrological Laboratory
NMMU	Nelson Mandela Metropolitan University
NMR	Nuclear Magnetic Resonance
NRF	National Research Foundation
NUFU	Norwegian Council of Universities Committee for Development, Research and Education
NWGA	National Wool Growers' Association

O

OABS	Optimal Agricultural Business Solutions
OECD	Organisation for Economic Co-operation and Development

P

PARSA	Parasitological Association of Southern Africa
PDMIW	Processing and Disposal of Mineral Industry Wastes
POT	Peaks over Threshold
PPP	Public Private Partnership
PRT	Protein Research Trust

R

RICS	Royal Institute of Chartered Surveyors
RIEP	Research Institute of Education Planning
RNA	Research Niche Area
RPO	Red Meat Producers' Organisation

S

SA	South Africa
SAACE	South African Association of Consulting Engineers
SAB	The South African Breweries Limited
SACI	South African Chemical Institute
SACPCMP	South African Council for the Project and Construction Management Profession
SACPVP	South African Council for the Property Valuation Profession
SACQSP	South African Council for the Quantity Surveying Profession
SADC	Southern African Development Community
SAFMA	South African Facilities Management Association
SAFOI	South African Fryer Oil Initiative
SAIP	South African Institute of Physics
SAISC	Southern African Institute of Steel Construction
SAMSI	Statistical and Applied Mathematical Sciences Institute

SANCIAHS	South African National Committee for the International Association of Hydrological Sciences	SEDA	Small Enterprise Development Agency	UNEP	United Nations Environment Programme
SANCU	South African National Consumer Union	SMME	Small, Medium and Micro Enterprises	UNESCO	United Nations Educational, Scientific and Cultural Organisation
SANPAD	South Africa-Netherlands Research Programme on Alternatives in Development	SRC	Student Representative Council	USA	United States of America
SAPOA	South African Property Owners' Association	SRL	Sustainable Rural Livelihood	USAID	United States Agency for International Development
SAPS	South African Police Services	SSAG	Society of South African Geographers	UTCHEM	University of Texas Chemical Compositional Simulator
SAQA	South African Qualifications Authority	T		UWC	University of the Western Cape
SASAS	South African Society for Animal Science	THRIP	South African National Research Foundation Thrust for Industry-Related Projects	W	
SASQUA	Southern African Society for Quaternary Research	TUE	Technical University Eindhoven	WARFSA	Water Research Fund of Southern Africa
SAVAH	South African Association of Visual Arts Historians	U		WATOC	World Association of Theoretically Orientated Chemists
SBE	Sustainable Built Environments	UCT	University of Cape Town	WFP	World Food Programme
		UFS	University of the Free State	WITS	University of the Witwatersrand
		UJ	University of Johannesburg	WRC	Water Research Commission
		UK	United Kingdom	WUA	Water Users' Association
		UN	United Nations		