

**Ceremony 12**

**Faculty of Science**

- **School of Environmental Sciences**

**Monday, 10 April 2017, 09:30**

**Vodacom NMMU Indoor Sports Centre, South Campus, Summerstrand**



## **CONGRATULATORY MESSAGE**

Graduation is a momentous occasion, representing the crowning moment of all your hard work and the many sacrifices that you and your loved ones have made to reach this milestone.

For us, graduation is the highlight of the university calendar as we witness successful students cross the stage to be capped and enter a new chapter in their lives. Each of you has a unique story to tell.

We salute and applaud your achievement and wish you all the best in your future endeavours. Your time here at the Nelson Mandela Metropolitan University (NMMU) was but a stepping stone towards your future.

We trust that NMMU has equipped you not only with an excellent academic qualification for the many challenges of life and work, but also with life-changing experiences to shape your future.

It is our wish that you will leave here today as proud NMMU graduates who will continue to champion social justice and equality, and be change agents in building a better society and a better world.

Thank you for offering us the privilege of making NMMU a part of your life. Your success is our success, and as NMMU alumni, we look forward to watching your story unfold.

**Congratulations!**

**Ms Santie Botha  
Chancellor**



**Prof Derrick Swartz  
Vice-Chancellor**



## **ABOUT NMMU**

Nelson Mandela Metropolitan University (NMMU) is a new generation university, distinguished by a wide range of study options and access routes open to students. With 450 programmes from certificate through to doctoral level across 130 different career fields, NMMU truly is a comprehensive university.

Founded on more than a century of quality higher education, NMMU nurtures innovation, fosters creativity, embraces technology and develops people to meet the challenges of tomorrow. NMMU is a product of a merger of the University of Port Elizabeth and the PE Technikon in 2005. Prior to such a merger, the Vista University campus of Port Elizabeth was incorporated into the former University of Port Elizabeth. The university has a strong track record of research, working extensively in partnership with business and industry, making NMMU a valued contributor to the socioeconomic development of the region and beyond.

This year (2017), the university has 24530 students and close to 4100 permanent and contract staff, based on seven campuses in Nelson Mandela Bay and George.

### **Leaders**

NMMU's Vice-Chancellor is Professor Derrick Swartz, the Chancellor is Ms Santie Botha and the Chair of Council is Judge Ronnie Pillay.

### **Location**

Six of NMMU's campuses are in Nelson Mandela Bay and one is in George on the Garden Route. The seven campuses are:

- South Campus in Summerstrand (within a 720-hectare private nature reserve)
- North Campus in Summerstrand
- Second Avenue Campus, home to the new "green" Business School, in Summerstrand
- Bird Street Campus which will be a new postgraduate arts hub in Central
- Missionvale Campus in Missionvale
- George Campus in George
- The Ocean Sciences Campus (recently purchased from CSIR)

### **Facilities and supportive teaching and learning environment**

NMMU is privileged to have outstanding facilities. All students have access to well-equipped laboratories, some of which are open 24/7, and free Wi-Fi throughout all its campuses. All the lecture halls are equipped with the latest technology and students have the opportunity of using additional e-learning tools online. The campus libraries and information services network offers a state-of-the-art integrated online system. There are cafeterias, food courts and coffee shops.

A range of opportunities are provided to enhance the academic success of students. These include a first-year orientation programme, peer-facilitated learning opportunities (eg, Supplemental Instruction, e-PAL, tutorials, practicals, mentor programmes, 'Keys to Success' workshops and online resources). NMMU also promotes both in and outside of the class learning to enhance holistic student development. To recognise the learning that takes place outside of the class, NMMU has developed an innovative, electronic co-curricular record system.

The University also offers the finest sporting facilities in the Eastern Cape and numerous venues for conferences, meetings and other special events.

### **Faculties**

NMMU has seven faculties. They are:

- Arts
- Business and Economic Sciences
- Education
- Engineering, the Built Environment and Information Technology
- Health Sciences
- Law
- Science

### **Academic focus areas**

Though NMMU prides itself on its vast range of programme offerings, it has a number of strategic areas in terms of its core business of teaching and learning, research and engagement. They are:

- Health and wellness
- Economic and business development with a focus on job creation and entrepreneurship
- Materials and process development for industry and manufacturing
- Emerging information and communications technology for development
- Environmental and natural resource management
- Culture, communication and language
- Leadership, governance, democracy and justice
- Educational development in support of excellence in teaching, learning and curriculum
- Infrastructure and human settlement development

### **Strategic research areas**

- Biodiversity conservation and restoration
- Coastal marine and shallow water ecosystems
- Cyber citizenship
- Democratisation, conflict and poverty
- Earth Stewardship Science
- Health and wellbeing
- Humanising pedagogies
- Manufacturing technology and engineering
- Nanoscale characterisation and development of strategic materials
- Science, Mathematics and Technology Education for Society
- Strategic energy technologies
- Sustainable human settlement development and management
- Sustainable local economic development

### **Research and Engagement entities**

NMMU has 31 focused faculty based and 7 institution-wide entities (institutes, centres and units) that exist over and above the formal academic structures that are aimed at promoting engagement, research, technology transfer and innovation. They include the likes of InnoVenton; NMMU's Institute for Chemical Technology and Downstream Chemicals; eNtsha, an institute that focuses on seeking solutions through engineering; Earth Stewardship Science Research Institute (ESSRI); and Institute for Coastal and Marine Research. Many are award-winning entities.

### **'Green' endeavours**

In line with its value of respect for the natural environment, NMMU is involved in a large number of "green" initiatives that will not only reduce its own carbon footprint but is also assisting others in seeking renewable energy resource solutions. The university's new Business School, for example, was the first in the country to be awarded four-star "green" accreditation for a public and education building by the Green Building Council of South Africa in 2013. The "green" agenda is supported by the Centre for Renewable Energy, which is recognised as a research leader in the field.

### **International links**

Just over 8% of NMMU's student body comes from 64 different countries outside of South Africa. The Office for International Education fosters relationships and manages inter-institutional linkages to enrich both NMMU staff and students. These partnerships also foster our growing research. NMMU regularly sends students for study abroad opportunities.

### **Reasons to be proud:**

- NMMU's diversity and multiculturalism. Our African students alone come from 34 countries on the continent.
- The High Resolution Transmission Electron Microscopy (HRTEM) Centre, which opened in 2011, is the only place in Africa where scientists can view atoms in line with NMMU's growing prominence for nanoscience.
- More than 40% of NMMU academic staff have doctoral degrees when compared to the national average of 33%.
- New infrastructure like the iconic Engineering block on North Campus and the new Human Movement Science Building complete with a 100m research sprint track on South Campus.
- NMMU has excellent links with industry and business, particularly within the pharmacy, tourism and automotive industries.
- NMMU's ongoing education partnership with Fifa, as one of only two presenters in Africa of an international sports management programme through the Centre International d'Etude du Sport (CIES).
- The success of being the first student racing team from Africa to successfully compete in the Formula Student event in Germany. NMMU students designed and built a racing car to exacting specifications.
- The university was selected in 2012 to facilitate the country's first electric e-mobility programme and technical centre, called the uYilo e-mobility programme.
- NMMU has extensive expertise within the field of friction processing which has resulted in numerous national awards for the patented technology, WeldCore®. This technology has also aligned the strategic partnership between NMMU and Eskom.
- NMMU's accounting and pharmacy students who continue to produce top results in their national external examinations.
- NMMU's international award-winning choir which continues to perform around the globe to wide acclaim.

## **ACADEMIC DRESS**

Special academic attire was designed for office bearers at Nelson Mandela Metropolitan University to be worn at prestigious academic events like graduation.

Each outfit – from that of the Chancellor and Vice-Chancellor to those of the Executive Deans – has been especially selected to signify a particular office, in keeping with attire worn by academics at leading universities throughout the world.

The gowns, caps and hoods of NMMU graduates were similarly inspired and are explained in detail below.

### **Academic dress for graduates at NMMU is as follows:**

#### **Doctoral degrees**

**Gown:** Cardinal red polyester cashmere gown with long pointed sleeves pleated up with blue cord and button and lined with blue satin with 125mm facings and a blue collar.

**Hood:** Full shape hood in cardinal red polyester cashmere lined with faculty colour satin and edged around the cowl with 75mm faculty colour ribbon with 15mm blue ribbon overlaid central. 50mm wide straight neckband in cardinal red polyester cashmere, 25mm faculty colour ribbon in centre of neckband with 15mm blue ribbon overlaid central to faculty ribbon.

**Cap:** Round doctor's bonnet in black velvet with faculty colour cord and tassel.

#### **Master's degrees**

**Gown:** Black gown, long pointed sleeves pleated up with blue twisted double cord and button. Similar cord detail is used.

**Hood:** Full shape blue hood lined faculty colour satin and edged around the outside of the cowl with 75mm faculty colour with ribbon. 50mm straight neckband in blue with 25mm faculty colour ribbon centred.

**Cap:** Black mortarboard with blue tassel.

#### **Postgraduate diplomas**

**Gown:** Black gown, long pointed sleeves pleated up with blue twisted double cord and button. Similar cord detail.

**Hood:** Blue simple shape hood lined silver grey satin. Straight neckband with 15mm faculty ribbon on top edge of neckband and around cowl. 15mm silver grey ribbon on bottom edge of neckband and around cowl spaced 20mm away from the faculty colour.

**Cap:** Black mortarboard with blue tassel.

#### **Bachelor honours degrees**

**Gown:** Black gown, long pointed sleeves pleated up with blue twisted double cord and button. Similar cord detail.

**Hood:** Blue simple shape hood lined silver grey satin with 50mm wide straight neckband in faculty colour. Cowl edged 75mm faculty colour ribbon on the outside. 15mm silver grey ribbon runs along the outer edge of the cowl, overlaid on faculty ribbon and on top edge of neckband.

**Cap:** Black mortarboard with blue tassel.

#### **Four-year bachelor's degrees (including Bachelor of Technology degrees)**

**Gown:** Black gown, long pointed sleeves pleated up with blue twisted double cord and button. Similar cord detail.

**Hood:** Blue simple shape hood lined silver grey satin with 50mm wide straight neckband in faculty colour. Cowl edged 75mm faculty colour ribbon on the outside. Silver grey cord runs along the outer edge of the cowl, overlaid on faculty ribbon and on top edge of neckband.

**Cap:** Black mortarboard with blue tassel.

#### **Three-year bachelor's degrees**

**Gown:** Black gown, long pointed sleeves pleated up with blue twisted double cord and button. Similar cord detail.

**Hood:** Blue simple shape hood lined with silver grey satin with 50mm wide straight neckband in faculty colour. Cowl edged 75mm faculty colour ribbon on the outside.

**Cap:** Black mortarboard with blue tassel.

### **Advanced diploma**

**Gown:** Black gown, long pointed sleeves pleated up with blue twisted double cord and button. Similar cord detail.

**Hood:** Blue simple shape hood lined with silver grey satin with 50mm wide straight neckband. 15mm faculty colour ribbon on top and bottom of neckband around cowl.

**Cap:** Black mortarboard with blue tassel.

### **Diploma**

**Gown:** Black gown, long pointed sleeves pleated up with blue twisted double cord and button. Similar cord detail.

**Hood:** Blue simple shape hood with 50mm wide straight neckband. 25mm faculty colour ribbon on centre of neckband.

**Cap:** Black mortarboard with blue tassel.

### **Faculty colours**

Arts:	Yellow
Business & Economic Sciences:	Plum
Health Sciences:	Apple green
Law:	Grey blue
Education:	Orange
Science:	Dark green
Engineering, the Built Environment and Information Technology:	Light blue
Business School	Black and magenta

**Messrs T. Birch & Co (Pty) Ltd and its subsidiary, Croft Magill & Watson (Pty) Ltd, have been appointed as official robemakers to the University and as contracted suppliers of choice to students for graduation academic attire.**

**The Image Factor has been appointed as the official photographer of the University.**

## **2017 AUTUMN GRADUATION CEREMONIES APRIL 2017**

<b>Friday, 31 March 2017</b>		
<b>Ceremony 1</b>	<b>09:30</b>	George Campus All Programmes
<b>Tuesday, 4 April 2017</b>		
<b>Ceremony 2</b>	<b>09:30</b>	Faculty of Arts (School of Architecture; School of Music, Art & Design and School of Language, Media & Culture)
<b>Ceremony 3</b>	<b>14:30</b>	Faculty of Education
<b>Wednesday, 5 April 2017</b>		
<b>Ceremony 4</b>	<b>09:30</b>	Faculty of Business and Economic Sciences (School of Management Sciences - excluding Undergraduate Diploma qualifications)
<b>Ceremony 5</b>	<b>14:30</b>	Faculty of Arts (School of Governmental & Social Sciences)
<b>Thursday, 6 April 2017</b>		
<b>Ceremony 6</b>	<b>09:30</b>	Faculty of Business and Economic Sciences (School of Economics, Development & Tourism)
<b>Ceremony 7</b>	<b>14:30</b>	Faculty of Business and Economic Sciences (School of Industrial Psychology & Human Resources, Graduate School and others)
<b>Friday, 7 April 2017</b>		
<b>Ceremony 8</b>	<b>09:30</b>	Faculty of Engineering, the Built Environment and Information Technology (School of the Built Environment)
<b>Ceremony 9</b>	<b>14:30</b>	Faculty of Engineering, the Built Environment and Information Technology (School of Engineering)
<b>Saturday, 8 April 2017</b>		
<b>Ceremony 10</b>	<b>09:30</b>	Faculty of Engineering, the Built Environment and Information Technology (School of Information & Communication Technology)
<b>Ceremony 11</b>	<b>14:30</b>	Faculty of Science (School of Computing Sciences, Mathematics, Physics & Statistics and School of Biomolecular & Chemical Sciences)
<b>Monday, 10 April 2017</b>		
<b>Ceremony 12</b>	<b>09:30</b>	Faculty of Science (School of Environmental Sciences)
<b>Ceremony 13</b>	<b>14:30</b>	Faculty of Law  Faculty of Business and Economic Sciences (School of Accounting, Postgraduate qualifications including Bachelor of Technology degrees)
<b>Tuesday, 11 April 2017</b>		
<b>Ceremony 14</b>	<b>09:30</b>	Faculty of Health Sciences (School of Clinical Care Sciences and School of Medicinal Sciences)
<b>Ceremony 15</b>	<b>14:30</b>	Faculty of Health Sciences (School of Behavioural Sciences and School of Lifestyle Sciences)
<b>Wednesday, 12 April 2017</b>		
<b>Ceremony 16</b>	<b>09:30</b>	Faculty of Business and Economic Sciences (School of Accounting – Undergraduate qualifications)
<b>Ceremony 17</b>	<b>14:30</b>	Faculty of Business and Economic Sciences (School of Management Sciences – Undergraduate Diploma qualifications)

## **OFFICE-BEARERS OF THE UNIVERSITY**

### **CHANCELLOR**

MS S BOTHA: BEcon, BEconHons(US)

### **CHAIRPERSON OF COUNCIL**

JUSTICE R PILLAY: BA, LLB(UDW)

### **VICE-CHANCELLOR**

PROF DI SWARTZ: BA(UWC), MA, DPhil, Doctor in Human Rights Law (hc)(Essex University, UK)

### **DEPUTY VICE-CHANCELLOR: INSTITUTIONAL SUPPORT**

DR SW MUTHWA: BA(SW)(Fort Hare), BA(SW)Hons(Wits), MSc, PhD(London University, UK)

### **DEPUTY VICE-CHANCELLOR: RESEARCH AND ENGAGEMENT**

PROF AWR LEITCH: BSc, BScHons, MSc, PhD(UPE)

### **DEPUTY VICE-CHANCELLOR: TEACHING AND LEARNING**

PROF DM ZINN: BA, BAHons, HDE(UCT), MEd, DEd(Harvard University, USA)

### **EXECUTIVE DIRECTOR: FINANCE**

MR MR MONAGHAN: BCom(UPE), BComHons(UNISA), Professional Accountant(SA)

### **EXECUTIVE DIRECTOR: HUMAN RESOURCES**

MS VN BAM: BSocSc(UCT), PGDip(UFH), MBL(UNISA)

### **REGISTRAR**

DR F GOOLAM: BSc, HDE, BEd, MEd(UDW), PhD(UP)

### **PRESIDENT OF ALUMNI ASSOCIATION**

DR R JONAS: BA(UWC), HDE, BAHons(Unisa), MA(UPE), PhD(NMMU)

### **EXECUTIVE DEANS OF FACULTIES:**

#### **ARTS**

PROF MJR BOSWELL: BSocSc, BSocScHons, MSocSc(UCT), PhD(Vrije Universiteit, Netherlands)

#### **BUSINESS AND ECONOMIC SCIENCES**

DR I LAGARDIEN: PGDip, MSc(London School of Economics), PhD(University of Wales)

#### **EDUCATION**

DR SF MOENG: BA, HDE, BEdHons(UPE), MSc(St Cloud State University, USA), DEd(NMMU)

#### **ENGINEERING, THE BUILT ENVIRONMENT AND INFORMATION TECHNOLOGY**

DR OSW FRANKS: BSc MechEng, MInd Admin(UCT), Hons (B&A)(US), PhD (Engineering Science)(USF - USA), Pr Eng

#### **HEALTH SCIENCES**

PROF L PEPETA: MBChB (Unitra), FCPAED(SA), DCH(SA), MMed (Wits)

#### **LAW**

PROF A GOVINDJEE: BA, LLB(RU), LLM(UPE), LLD(NMMU)

#### **SCIENCE**

PROF A MURONGA: BSc, UED(UNIVEN), BScHons, MSc(UCT), PhD (University of Minnesota, USA)

#### **DEAN OF TEACHING AND LEARNING**

PROF CD FOXCROFT: BA, BAHons, MA, DPhil(UPE)

#### **DEAN OF STUDENTS**

MR LP JACK: NDip(PMA)(EC Technikon), BTech(PM)(PET), BAPhil(US), MCom(UKZN)

## **ORDER OF PROCEEDINGS**

### **ENTRANCE OF ACADEMIC PROCESSION**

*(The congregation is requested to rise while the academic procession enters the hall)*

### **MOMENT OF SILENCE**

Director: Marketing and Corporate Relations  
*(The congregation is requested to remain standing)*

### **CONSTITUTION OF CONGREGATION AND WELCOME**

Vice-Chancellor  
*(The congregation is requested to be seated)*

### **AWARDING OF QUALIFICATIONS**

Vice-Chancellor

### **DISSOLUTION OF CONGREGATION**

Vice-Chancellor

### **NATIONAL ANTHEM**

*(The congregation is requested to stand for the singing of the National Anthem)*

### **DEPARTURE OF ACADEMIC PROCESSION**

*(The congregation is requested to remain standing until the academic procession has left the hall)*

---

## **INFORMATION TO MEMBERS OF THE CONGREGATION**

*Members of the congregation are requested:*

- *To rise and remain standing while the academic procession enters and leaves the hall.*
- *Not to leave the hall before the end of the ceremony.*
- *To switch off cellular phones or turn them on silent mode.*
- *Not to move around in the hall.*
- *Not to eat and drink in the hall.*
- *Not to get up and take photographs during the ceremony.*
- *To limit cheering and ululating to a minimum.*



The words **Cum Laude** indicates in the text below that the diploma or degree is awarded with distinction to the candidate/s listed.

## **NATIONAL DIPLOMA: AGRICULTURAL MANAGEMENT**

BOTA, Sinoxolo  
DLAMINI, Nyameka  
DYAKOPU, Sandile Arthur  
DYIDO, Simthembile  
FOLISH, Buyelwa  
GAXO, Azile  
GCISA, Phila  
GIBENI, Phateka  
GXASHEKA, Ayanda  
JAAS, Mkhuselel Kavini  
KANI, Andisiwe Lorretha  
KANISA, Mpumelelo  
KONZE, Nyameko  
MADONONO, Liyabona  
MAJEKE, Esihle Kate  
MAJOKWENI, Sandisele  
MAJOVA, Yolanda  
MALOBOLA, Luvo Xolela  
MAMPHWE, Asivhanzhi  
MATOMELA, Luzuko Bethuel  
MFUKU, Lutholwethu  
MKHIZE, Sandisiwe Precious  
MONI, Zintle

MORROW, Dionne Kirstie  
MOYAKE, Saxola  
MTSHONTSHI, Avela  
NCUBE, Ndzalama  
NIKANI, Zandile Maria  
NTSANGANI, Ayabulela  
PAUL, Xolisa  
PRINSLOO, Ilse Lee-Anne  
PUTUZO, Bulelani  
PUTUZO, Masande  
SOKOYI, Lilitha Alicia  
STUURMAN, Sibulele  
TABOSHE, Zimkitha  
TYHALA, Sinethemba Collen  
WILLIAMS, Ndyebo  
XAMLASHE, Tulani  
XOBANI, Asive  
ZINYA, Yolisa

### ***CUM LAUDE***

BUSO, Musa  
MABIZA, Pamela Rumbidzayi

## **NATIONAL DIPLOMA: GAME RANCH MANAGEMENT**

BOWLES, Shaun Zane  
BURGER, Stefan John  
BUTLER, William - John  
DE ROUBAIX, Lanielle  
EWELS, Dale Peter  
GOUWS, Stephen Wesley  
HOLLOWAY, Michael Andrew  
KEYSER, Jan De Waal  
KWEBA, Siviwe Zinzile  
LAHDEAHO, Jean Sebastian

LOUW, Jacques Vincent  
MURRAY, Jason Gareth  
PRESTON, Matthew William  
VAN ONSELEN, Kenan Daniel  
WIERENGA, Weber Egbert

### ***CUM LAUDE***

KOUKAKIS, Learndra

## **BACHELOR OF SCIENCE**

BELLE, Tessa Georgia  
BOTHIA, Ruan  
BOYANA, Pumelela  
BUHLUNGU, Zilungile  
CHETTY, Ranita  
CLARK, Fiona  
COUNIHAN, Matthew David  
DE LANGE, Michelle Jayne  
DEE, Charissa  
DELPOR, Rowan Lee  
DODD, Carla  
DYAN, Siyasanga  
DZIMWASHA, Tatenda Lorraine  
ELS, Jessica  
ENGELBRECHT, Melindi Frances  
FAVARETTO, Bianca Sashika  
FRANCIS, John Thomas  
GEORGE, Phagan Laurie-Anne  
GXABA, Siyasanga Zinzi  
HEWETT, Kyle Travis Brownlow  
HICKMAN, Samantha  
KHAN, Bushraa  
LEMMER, Michaela Jayde  
LIDDELL, Duncan Carlyle  
LUKHELE, Victor Bongani  
MANXIWA, Sabelo  
MAPHOSA, Sean Tafara  
MARITZ, Megan  
MC GREGOR, Steven

MNYAIZA, Alizwa Nombulelo  
MPHEPHU, Konanani Innocent  
MQANYA, Sinenhlanhla Fortunate  
MYATAZA, Chulumanco  
NAIR, Sabarinathan  
NAMBA, Nobahle  
NAZO, Sivuyisiwe  
NELL, Chandre  
NJISANE, Oyisile Aphile  
NOMDLANGE, Asiphe  
OOSTHUIZEN, Korban  
POTGIETER, Tayla Lee  
QOBOKA, Asemahle  
RAMOHLALE, Tshegofatso Sekgopo Edwin  
RAUTENBACH, Finn  
SCHECKLE, Tara  
SLABBERT, Jordan Lee  
SMIT, Travis  
SMITH, Sarah Jane  
TSHABALALA, Siphwiwe Mswati  
VAN DER KUIP, Reinier  
VAN TONDER, Monique  
VENTER, Meggin Brittany  
WICHT, Jake Dylan  
ZINIKELE, Nkosikhona

### ***CUM LAUDE***

BUCKSEY, Rachel Margaret  
SMIT, Taryn

## BACHELOR OF TECHNOLOGY: AGRICULTURAL MANAGEMENT

ADONIS, Zozibini  
BOKWANA, Melikhaya Maxwell  
BONTSA, Siyamanga Mdmiseni Luvuyo  
CELE, Phindile Goodness  
CHITHA, Siyanda Glory  
DANGAZELA, Luyolo  
DUNN, Bridget Lorraine  
FANA, Sinayo  
FRANCIS, Shree Ann  
GCASAMBA, Zodwa  
GLADILE, Zibele  
HOLMES, Whitney  
KAMA, Zenzeka  
KANYA, Mzingisi Wiseman  
KHANYA, Vuyolwethu  
KHANYILE, Langelihle Priscila  
KHONZANI, Sandisiwe Grace  
KOMAPE, Stephina Chuene  
LINDA, Sazi Zethembe  
MABENGU, Zizipho  
MABODLI, Sinikiwe  
MABOHLO, Sakikhaya  
MAJIKIJELA, Akhona  
MANDLANA, Nonzondelelo Jessica  
MANGESI, Silindokuhle  
MAQOLO, Lindelwa  
MARWANQA, Vuyokazi  
MASISA, Luthando  
MATANZIMA, Songo  
MATIWANE, Nomasonto Sandisiwe

MATYE, Noxolo Aretha  
MBAMBO, Buchule  
MFAXA, Lwando  
MHLAHLO, Andisiwe  
MHLONGO, Msawenkosi Michael  
MLUNGWANA, Asive  
MOKATSOANE, Lineo Constance  
MOSOMANE, Smangaliso Samson  
MTHEMBU, Kwanele  
MTSOLOONGO, Phila  
MTWAZI, Asanda  
NGCOBO, Sthembelo Bonginhlhla  
NGQOKOMASHE, Hlumisa  
NGUBELANGA, Diago Yolatha  
NGWANE, Siyabulela Samuel  
NKOMONTLE, Avuziwe Unathi  
NOGWEBELA, Anelisa  
NONGOGO, Sesethu  
NONTONGANA, Sibonokuhle  
NOQA, Kayaletu  
NQEKETO, Nondili Sisanda  
NTANGA, Sibulele Percy  
NYINGWA, Anelisa  
PANDELA, Yanga Wendy  
PHEHLUKWAYO, Roseline Nozipho  
SATULA, Simamkele Zipho-Zakhe  
SEBAKE, Tebogo Matsimela  
SIFO, Ephrose Nomnyaka  
TSHAMBULA, Akhona Siphokazi  
VILAKAZI, Samukelisiwe Fortunate

## BACHELOR OF TECHNOLOGY: GAME RANCH MANAGEMENT

BEZUIDENHOUT, Alberto Johannes Petrus  
CAIRNCROSS, Kelly Inga  
FULLER, Ryan Neville

HORN, Donovan  
VORSTER, Wikus

## BACHELOR OF SCIENCE HONOURS

BARKHUYSEN, Andrea-Mari (Geology)  
BUSO, Inga Ayasinika (Environmental Geography)  
EDWARDS, Mark Joseph Kalahari (Geology)  
HAMZA, Mbulelo (Geographical Information Systems)  
HESEWU, Ziphonke (Geology)  
HUCUI, Aiser Ukuemande Ernesto (Geology)  
KAMPMAN, Suritha (Environmental Geography)  
KUNJWA, Thulisile (Geology)  
LUSCOMBE, Given David (Environmental Geography)  
MAJARANA, Vuyolwethu (Geology)  
MLAMLA, Sive (Environmental Geography)  
MPENGE, Lorna (Geology)  
MQALO, Gcobisa (Geology)  
NDABA, Khwezi Lindelani Bridgette (Botany)

NOLTE, Christopher Robin (Zoology)  
SCHRODER, Klaus (Environmental Geography)  
SIKUTSHWA, Lizeka (Geology)  
STIMELA, Zizo (Geology)  
STRYDOM, Elzani (Geology)  
TEMBE, Thandeka Nonceba (Environmental Geography)  
TSHIBALANGANDA, Muofhe (Geology)  
ZUZE, Hillary Don (Environmental Geography)

### CUM LAUDE

CAMPBELL, Richard Duncombe (Geology)

## BACHELOR OF SCIENCE HONOURS IN BOTANY

BLEWETT, Alec Bran  
DUSTAN, Chad Garreth  
FORT, Chelsea Nathania  
GUMMOW, William Thomas Jr  
GWAYISE, Zodidi  
JOHNSON, Jaime Leigh  
MBAMBO, Sibonokuhle Thandwayo  
MORIARTY, Lauren Alethea  
MULDER, Ivan Heinrich

TUSWA, Asandiswa  
VENTER, Lukas Johannes

### CUM LAUDE

DOMONEY, Nicola Leah  
MACQUEEN, Timothy Paul  
SMITH, Megan

## BACHELOR OF SCIENCE HONOURS IN GEOGRAPHICAL INFORMATION SYSTEMS

CRICHTON, Gregory  
FOXI, Gcobisa  
MAZOSIWE, Babalwa  
MFOPA, Caroline Reitumetse  
NDZELU, Sanele Sydwell  
QOGI, Ongeziwe  
SHANGASE, Zipho Innocent

XAYIMPI, Onke

### **CUM LAUDE**

BIJOUX, Jemima Veneta  
CAMILLE, Lyroy Savio Anthony

## BACHELOR OF SCIENCE HONOURS IN ZOOLOGY

BAILEY, Lauren Ashleigh  
CELE, Jennifer  
EVLAMBIOU, Anthony Andreas  
GINSBURG, Tayla  
MXO, Rebecca Vuyolwethu  
TRICAM, Shayla

VAN DER WESTHUIZEN, Shene Leonie

### **CUM LAUDE**

BARNARDO, Toshka

## MASTER OF SCIENCE (RESEARCH)

BANASIAK, Natalia Matgorzata – **Cum Laude**  
(Zoology)

Title of dissertation:

*ASSESSING THE OUTCOME AND CONSEQUENCES OF LARGE CARNIVORE REINTRODUCTIONS TO THE EASTERN CAPE, SOUTH AFRICA*

Supervisor: Prof GIH Kerley  
Co-supervisor: Dr MW Hayward

BOTHA, Jonathan Aubrey – **Cum Laude**  
(Zoology)

Title of dissertation:

*RESOURCE PARTITIONING IN THE WORLDS' LARGEST GANNETRY*

Supervisor: Dr PA Pistorius

CONRY, Danielle Shane  
(Zoology)

Title of dissertation:

*POPULATION STATUS AND HABITAT USE OF INDO-PACIFIC HUMPBACK DOLPHINS (SOUSA CHINENSIS) ALONG THE SOUTH COAST OF SOUTH AFRICA*

Supervisor: Dr PA Pistorius  
Co-supervisor: Dr SP Kirkman

DROST, Eduard Frans  
(Biological Oceanography)

Title of dissertation:

*SITE FIDELITY OF SOUTHERN RIGHT (EUBALAENA AUSTRALIS) AND HUMPBACK WHALES (MEGAPTERA NOVAEANGLIAE) IN ALGOA BAY, SOUTH AFRICA*

Supervisor: Dr SEE Plon

GERBER, Amarein Judith – **Cum Laude**  
(Zoology)

Title of dissertation:

*ADJUSTING LION DIET ESTIMATES TO ASSESS LION IMPACTS ON SMALL PREY IN ADDO ELEPHANT NATIONAL PARK*

Supervisor: Prof GIH Kerley  
Co-supervisor: Dr CJ Tambling

GEROLEMOU, Rosie Victoria  
(Geography)

Title of dissertation:

*THE SUITABILITY OF REMOTE SENSING FOR PRIORITISING MANAGEMENT OF INVASIVE PLANTS IN THE GARDEN ROUTE SOUTH AFRICA*

Supervisor: Prof C Fabricius  
Co-supervisors: Drs DJ Roux and H van Deventer

GOOSEN, Gerrit Pieter  
(*Geography*)

Title of dissertation:

*AN INVESTIGATION OF THE MOVEMENT OF SEDIMENT THROUGH THE NOORDHOEK HEADLAND BYPASS DUNEFIELD SYSTEM AT CAPE RECIFE, SOUTH AFRICA*

Supervisor: Prof V Kakembo  
Co-supervisor: Mr C Anderson and Prof D Mikes

---

MARTIN, Stephanie Ann  
(*Zoology*)

Title of dissertation:

*THE AARDVARK AS AN ECOLOGICAL ENGINEER IN THE EASTERN KAROO: DIG PATTERNS AND EMERGENT PROCESSES*

Supervisor: Prof GIH Kerley  
Co-supervisor: Dr M Landman

---

MAWASHA, Tshepo Sylvester  
(*Geography*)

Title of dissertation:

*THE APPLICATION OF GIS AND REMOTE SENSING TO ASSESS THE EFFECT OF PERIODIC FLOODING ON COMMUNITIES ALONG THE JUKSKEI RIVER: A CASE STUDY AT ALEXANDRA TOWNSHIP, JOHANNESBURG, SOUTH AFRICA*

Supervisor: Dr HW Britz

---

MBENSE, Sinegugu Prudence – **Cum Laude**  
(*Botany*)

Title of dissertation:

*THE GROWTH AND RECOVERY OF MANGROVES AT THREE SOUTH AFRICAN STUDY SITES*

Supervisor: Prof JB Adams  
Co-supervisor: Dr A Rajkaran

---

MFIKILI, Athi Nkosibonile  
(*Botany*)

Title of dissertation:

*INFLUENCE OF SEDIMENTOLOGICAL AND HYDROLOGICAL PROCESSES ON THE DISTRIBUTION OF SPARTINA MARITIMA SALT MARSH IN THE KEURBOOMS ESTUARY, WESTERN CAPE*

Supervisor: Dr TG Bornman  
Co-supervisor: Dr DR du Preez

---

MULLER, Cuen  
(*Zoology*)

Title of dissertation:

*EVALUATING THE IMPORTANCE OF MANGROVES AS FISH NURSERIES IN TEMPERATE SOUTH AFRICAN ESTUARIES*

Supervisor: Prof NA Strydom

---

NAIDOO, Lyndle Sherae  
(*Botany*)

Title of dissertation:

*IDENTIFICATION AND CLASSIFICATION OF MICRO-ESTUARIES USING SELECTED ABIOTIC AND BIOTIC CHARACTERISTICS ALONG THE EASTERN CAPE COAST, SOUTH AFRICA*

Supervisor: Prof JB Adams  
Co-supervisor: Dr LRD Human

---

OSWALD, Krista Natasha  
(*Zoology*)

Title of dissertation:

*SEASON PHYSIOLOGICAL RESPONSES IN THE CAPE ROCKJUMPER (CHAETOPS FRENATUS); A FYNBOS ENDEMIC BIRD SHOWS LIMITED CAPACITY TO DEAL WITH TEMPERATURE EXTREMES*

Supervisor: Dr B Smit  
Co-supervisor: Dr ATK Lee

---

PATTINSON, Nicholas – **Cum Laude**

(Zoology)

Title of dissertation:

*SEASONAL PHYSIOLOGICAL AND BEHAVIOURAL RESPONSES OF A SMALL BIRD IN A HOT, ARID HABITAT*

Supervisor: Dr B Smit

---

SLAMANG, Shereen

(Geology)

Title of dissertation:

*A SEDIMENTOLOGICAL AND STRUCTURAL STUDY OF THE LOWER ECCA GROUP, WITH A FOCUS ON FACIES ANALYSIS OF THE COLLINGHAM FORMATION, NORTH OF GRAHAMSTOWN, SE KAROO BASIN, SOUTH AFRICA*

Supervisor: Prof D Mikes

Co-supervisors: Prof PWK Booth

---

WITTE, Andrew Dennis

(Botany)

Title of dissertation:

*BENTHIC ALGAL COMMUNITIES OF SHALLOW REEFS IN THE EASTERN CAPE: AVAILABILITY OF ABALONE HABITAT*

Supervisor: Dr P Steyn

Co-supervisor: Dr DR du Preez

---

#### **MASTER OF TECHNOLOGY: AGRICULTURE (RESEARCH)**

GQIBITYALA, Akhona

Title of dissertation:

*FARMERS' PERCEPTIONS ON FACTORS INFLUENCING SMALL SCALE VEGETABLE PRODUCTION AT TSENGIWE VILLAGE, SOUTH AFRICA*

Supervisor: Dr TM Pittaway

Co-supervisors: Dr N Mlisa and Mr M Khapayi

---

MURDOCH, Jacques Pierre

Title of dissertation:

*IDENTIFYING EMPLOYMENT GROWTH POTENTIAL IN THE WESTERN CAPE AGRI-PROCESSING SECTOR*

Supervisor: Prof P duP van Niekerk

Co-supervisor: Dr MG Wallace

---

## DOCTOR OF PHILOSOPHY

COBBING, Jude Edmund

(*Geology*)

Title of thesis:

*THE GROOTFONTEIN AQUIFER AT MAHIKENG, SOUTH AFRICA AS A HYDRO-SOCIAL SYSTEM*

Supervisor: Prof MJ de Wit

---

DU PLOOY, Schalk Jacobus

(*Botany*)

Title of thesis:

*ECOPHYSIOLOGY AND NUTRIENT UPTAKE MECHANISMS FACILITATING THE PROLONGED BLOOM PERSISTENCE BY CYANOTHECE SP. IN LAKE ST LUCIA, SOUTH AFRICA*

Supervisor: Prof R Perissinotto

Co-supervisor: Dr DR du Preez

---

LE ROUX, Elizabeth

(*Zoology*)

Title of thesis:

*THE ROLE OF APEX PREDATORS IN ECOSYSTEM FUNCTION. FEAR TRIGGERED CASCADES REGULATED BY DIFFERENTIAL PREY VULNERABILITY*

Supervisor: Prof JPGM Cromsigt

Co-supervisor: Prof GIH Kerley

---

MGQATSA, Nokubonga

(*Zoology*)

Title of thesis:

*TREE-TOPPLING BY ELEPHANTS AND ITS CONSEQUENCES IN THICKET MOSAIC VEGETATION OF ADDO ELEPHANT NATIONAL PARK*

Supervisor: Prof GIH Kerley

Co-supervisors: Dr M Landman and Prof JPGM Cromsigt

---

NTHOLI, Thakane Thato Prudence

(*Geology*)

Title of thesis:

*A TECHNICAL AND ECONOMIC EVALUATION OF A PASSIVE UNDERGROUND MINE-WATER PURIFICATION SYSTEM (PUMPS): A GEOTHERMALLY POWERED GEO-ENGINEERING SYSTEM DESIGNED FOR IN-SITU BIO-REMEDICATION OF ACID MINE WATER*

Supervisor: Prof MJ de Wit

---

RAW, Jacqueline Leoni

(*Zoology*)

Title of thesis:

*ECOLOGY OF KEY CERITHIOIDEAN GASTROPODS IN THE MANGROVES OF THE iSIMANGALISO WETLAND PARK, KWAZULU-NATAL, SOUTH AFRICA*

Supervisor: Prof R Perissinotto

Co-supervisor: Dr NAF Miranda

---

RISHWORTH, Gavin Midgley

(*Oceanography*)

Title of thesis:

*COMMUNITY STRUCTURE AND TROPHIC RELATIONS IN MARINE TUSA STROMATOLITE POOLS OF THE EASTERN CAPE*

Supervisor: Prof R Perissinotto

Co-supervisor: Dr MS Bird

---

RYKLIEF, Rabiah  
(Zoology)

Title of thesis:

*GANNETS IN CONTRASTING ENVIRONMENTS: BEHAVIOUR, DEMOGRAPHICS AND INDICATORS OF ENVIRONMENTAL CHANGE*

Supervisor: Dr PA Pistorius  
Co-supervisor: Dr LC Pichegru

---

SCHMIDT, Anton George  
(Zoology)

Title of thesis:

*BUSH CLUMPS AS INDICATORS OF THRESHOLDS OF CHANGE IN ARID THICKET MOSAIC BIOSPHERES*

Supervisor: Prof GIH Kerley

---

## **DOCTORAL DEGREE CITATIONS**

# **THE DEGREE OF DOCTOR OF PHILOSOPHY (GEOLOGY)**

## **JUDE EDMUND COBBING**

### **Previous qualifications:**

1993 BSc	University of Cape Town (UCT)
1999 PGCE	University of South Africa (UNISA)
2000 MSc	University College, London, UK

### **Thesis:**

*THE GROOTFONTEIN AQUIFER AT MAHIKENG, SOUTH AFRICA, AS A HYDRO-SOCIAL SYSTEM*

The Grootfontein aquifer supplies about 20% of Mahikeng's domestic water needs. In this thesis, Jude Cobbing's work first quantifies how over-abstraction of the good quality groundwater from the aquifer, mainly by irrigating farmers – but also by the boreholes supplying Mahikeng, caused the large natural spring draining the aquifer to disappear in 1981. Since then, groundwater levels have fallen by nearly 30 m. Next, Jude calculated that current abstractions need to fall by between 19 and 36 ML/day to bring the aquifer back into long-term balance and to supply Mahikeng's water needs, whilst retaining a strategic reserve for use during droughts.

Previous efforts to address declines since the 1970s have largely failed, despite the fact that this is one of the best hydro-geologically studied aquifers in South Africa. After integrating his scientific and social data, Jude demonstrates how the aquifer functions as a complex hydro-social system; and that institutional characteristics are the root cause of a collective inability to restore the aquifer to its full potential as a water resource. Jude reveals this as a sub-optimal 'Nash equilibrium' that will continue to prevail, as long as major groundwater users are unable or unwilling to reduce abstraction; and until a local forum with appropriate powers and shared understanding of the hydrogeological mechanisms of the aquifer, as well as its social and institutional functioning, can begin to realise the potential of the Grootfontein aquifer.

Jude then explores the cost and risk implications for environmental, economic and social sectors; and he provides a linked socio-technical solution for improving the water security of Mahikeng.

# THE DEGREE OF DOCTOR OF PHILOSOPHY (BOTANY)

## SCHALK JACOBUS DU PLOOY

### Previous qualifications:

2011 BSc (Marine Biology)

University of KwaZulu-Natal

2012 BSc Honours (Marine Biology)

University of KwaZulu-Natal

### Thesis:

*ECOPHYSIOLOGY AND NUTRIENT UPTAKE MECHANISMS FACILITATING THE PROLONGED BLOOM PERSISTENCE BY CYANOTHECE SP. IN LAKE ST LUCIA, SOUTH AFRICA*

Worldwide, the effects of climate change and eutrophication have been associated with persistent cyanobacterial blooms becoming more frequent. Schalk investigated the long-term survival and physiological adaptations of the cyanobacterium *Cyanothece* sp. to various environmental conditions that contributed to its bloom stage persisting for 18 months, uninterruptedly. The main findings are the high salinities, up to 300, at which *Cyanothece* sp. could perform important physiological processes, such as N- and P-uptake, photosynthesis and N<sub>2</sub>-fixation (at salinities below 120).

While photosystem II activity was not observed in *Cyanothece* sp., photosystem I activity was very robust. Salinity had a minor influence on electron-transport rates by photosystem I; while high temperatures (> 30°C) markedly increased the electron-transport rates. Rapid responses to hypo-osmotic shock (i.e. osmotic downshift during freshening events) by *Cyanothece* sp. cells also helped minimize cell rupture – due to the high turgor pressure. While grazing experiments indicated that the typical estuarine zooplankton species are able to graze on *Cyanothece* sp.; during the bloom, grazing was prevented by the inability of zooplankton to survive the high salinity levels prevailing in the lake.

These results are of broad application, given that cyanobacterial blooms are becoming more frequent worldwide, with possible negative effects on human health. Two chapters of original research from this thesis are already published in high-impact journals; and the other three are currently under review. The results of this research were also presented at several regional conferences, and at the the 55<sup>th</sup> Symposium of the Estuarine and Coastal Sciences Association, London UK, in September 2015.

# THE DEGREE OF DOCTOR OF PHILOSOPHY (ZOOLOGY)

**ELIZABETH LE ROUX**

**Previous qualifications:**

2004 BSc

2005 BScHons

2010 MSc

University of Pretoria

University of Pretoria

University of the Witwatersrand

**Thesis:**

*THE ROLE OF APEX PREDATORS IN ECOSYSTEM FUNCTION. FEAR TRIGGERED CASCADES REGULATED BY DIFFERENTIAL PREY VULNERABILITY*

The cascading effects of predators through altering ecological patterns in lower trophic levels is increasingly being demonstrated, particularly in relatively simple systems. However, in species-rich systems, such effects are less apparent, particularly where predation-insensitive megaherbivores occur. In this respect, African savannas provide important study opportunities. For her PhD, Liza le Roux explored patterns in trophic interactions amongst carnivores, vulnerable mesoherbivores (< 1000 kg body mass) and predator-invulnerable megaherbivores (> 1000 kg body mass) in an African savanna at a variety of spatial scales. This is found in the Hluhluwe-Umfolozi Park. She assessed population level responses of potential prey species to confirm this vulnerability; and she measured emergent ecological patterns in terms of grass communities.

In an elegant experiment, she manipulated predation risk at a fine scale, by removing plant cover that may conceal predators, in order to measure herbivore responses and the consequences thereof. These patterns were then also measured across natural gradients of predation risk.

Mesoherbivores showed significantly declining density responses to increasing predation pressure over a period of 30 years, this being stronger for smaller than large species. White rhino did not show this response, confirming the dichotomy of predation vulnerability between meso- and megaherbivores. At a landscape level, and over a decade, the occurrence and extent of grazing lawns, a plant community reflecting herbivory, was explained by the patterns of rainfall, fire and white-rhino abundance, demonstrating the importance of megaherbivores in driving this system. Within her experimental plots, the mesoherbivores responded strongly to perceived variation in predation risk, avoiding densely vegetated plots in favour of open plots.

In contrast, megaherbivores showed the opposite trend, favouring more densely vegetated plots, presumably providing more forage. As a consequence, mesoherbivores deposited more faeces on open plots, with megaherbivore faecal deposition being less affected, and the overall effect being increased faecal deposition on the more open plots. This was reflected in increased leaf phosphorus levels (but not nitrogen) in the open plots. Extending these studies to naturally occurring grazing lawns that vary in risk as a function of surrounding plant cover; she showed increased visitation frequency and faecal deposition by all herbivores on "safe" grazing lawns (more open) compared to risky grazing lawns; and again the megaherbivores did not show this sensitivity.

Through her study, Liza has provided considerable insight into the importance of predation risk in structuring savanna-ecosystem patterns and processes. Furthermore, she has for the first time demonstrated the unique role of megaherbivores in balancing predation-sensitive meso-herbivore effects; and thereby, she has highlighted the importance of studying African systems for developing an understanding of the Pleistocene ecosystems, with their intact megaherbivore assemblages, and the consequences of the virtually global Pleistocene loss of megaherbivores.

# THE DEGREE OF DOCTOR OF PHILOSOPHY (ZOOLOGY)

## NOKUBONGA MGQATSA

### Previous qualifications:

2007 BSc

2008 BScHons

2010 MSc

Walter Sisulu University  
Walter Sisulu University  
Nelson Mandela Metropolitan University

### Thesis:

*TREE-TOPPLING BY ELEPHANTS AND ITS CONSEQUENCES IN THICKET MOSAIC VEGETATION OF THE ADDO ELEPHANT NATIONAL PARK*

Elephants are widely recognised for their habit of pushing over savanna trees. Key questions that emerge relate to the occurrence of such tree-pushing in other habitats, the local ecological consequences thereof, and the mechanism whereby elephants may co-exist with these plant species. For her PhD studies, Nokubonga characterised the extent of tree-pushing in a landscape in the Addo Elephant National Park characterized by a mosaic of Thicket and Nama-Karoo habitats, previously used for goat farming, and to which elephants had been re-introduced.

She identified the patches created by the toppled trees, as focal sites to investigate the ecological consequences of such toppling, hypothesizing that these patches would alter patterns and processes at this scale. She characterised the patches in terms of their microclimate, and investigated the responses of plant communities, plants, and small mammals; and she also measured how granary and seed banks may be altered.

Finally, she developed and tested a conceptual model on how plant species may co-exist with elephants, but in an altered growth form.

Elephants pushed over a wide variety of plant species in this thicket mosaic habitat, focusing particularly on the jacket plum *Pappea capensis*, thus reflecting the abundance of the various species, their growth form, as well as their position on the landscape. This tree pushing declined with slope; and plants of comparable size, but growing as shrubs, were less likely to be pushed over than those growing as trees.

Within the patches formed by the toppled trees, altered microclimates typically included elevated humidity and lower soil moisture, and less extreme temperatures. Browsing pressure on plants within the patches declined, compared to similar nearby plants. Thus, the potential "nurse plant" role of the patches was supported. However, there was limited evidence of changes in plant communities within these patches, possibly reflecting a limited time since toppling. Small mammal communities responded strongly, with more species and higher biomass occurring in the patches. This led to elevated seed removal by rodents under the toppled trees; but there were no changes in seed banks that could be detected.

The hypothesis of elephant-tree toppling altering ecological processes on a local scale was thus supported.

The occurrence of these plant species in the form of shrubs in an area that has a relic population of elephants, together with the resprouting response of toppled trees (leading to a four times increase in density), supports the conceptual model of these plants persisting in the shrub form. This then leads to the hypothesis that elephant-tree toppling reflects the effects of domestic livestock that had altered the growth form of these plants from a shrub-form to a tree-form, and thus rendering them vulnerable to being toppled by elephants.

This hypothesis changes our view of this process to one of resetting ecological patterns, rather than the loss of trees.

# THE DEGREE OF DOCTOR OF PHILOSOPHY (GEOLOGY)

## THAKANE THATO PRUDENCE NTHOLI

### Previous qualifications:

2010 BScHons  
2012 MSc

University of Cape Town  
University of Cape Town

### Thesis:

*A TECHNICAL AND ECONOMIC EVALUATION OF A PASSIVE UNDERGROUND MINE-WATER PURIFICATION SYSTEM (PUMPS): A GEOTHERMALLY POWERED GEO-ENGINEERING SYSTEM DESIGNED FOR IN-SITU BIO-REMEDICATION OF ACID MINE WATER*

Thakane Ntholi describes a novel system for the *in-situ* remediation of **acid mine water (AMW)** in abandoned gold mines of South Africa. The concept mimics the chemical reactions observed at deep-sea hydrothermal vents (black and white smokers/geysers originating from underground). Here, hot, acidic, mineral-laden water is emitted from the vents; and it precipitates metal sulphides with the aid of sulphate-reducing bacteria. Thakane redesigned this natural system as a bio-reaction chamber containing selected bacteria at the bottom of a 3-4 km deep mine flooded with **AMW**.

Energy to drive the **PUMPS** is acquired through a geothermal system drilled to a depth of 8km, where temperatures are sufficient for geothermal energy harvesting. **AMW** is pumped down and circulated through hot rock. The heated **AMW** is used to generate electricity; and it is then channelled into the reaction chamber to undergo bio-remediation. Following treatment, the water flows back into the mine voids. Eventually, abandoned mines will be flooded with clean water that can be stored for social- and eco-system services.

Thakane calculated that the total volume of the gold mines is equivalent to at least twice the Vaal Dam. By adapting her geo-bio engineering model, a large sub-surface fresh-water reservoir can emerge below rural and urban Gauteng. Thakane successfully tested her bacterial model in various labs in Germany, USA and South Africa; and her drilling and geothermal designs and their economic viability in Austria. Thakane's system includes potential gold extraction well below the present depth-limits of our sub-economic mines. Thus, she presents a win-win model, with which to address this great ecological disaster.

# THE DEGREE OF DOCTOR OF PHILOSOPHY (ZOOLOGY)

**JACQUELINE LEONI RAW**

**Previous qualifications:**

2011	BSc (Marine Biology) ( <i>cum laude</i> )	University of KwaZulu-Natal
2012	BSc Honours (Marine Biology) ( <i>Summa cum laude</i> )	University of KwaZulu-Natal
2013	MSc (Marine Biology) ( <i>cum laude</i> )	University of KwaZulu-Natal

**Thesis:**

*ECOLOGY OF KEY CERITHIOIDEAN GASTROPODS IN THE MANGROVES OF THE ISIMANGALISO WETLAND PARK, KWAZULU-NATAL, SOUTH AFRICA*

Jacqueline's research focused on ecological aspects of three mangrove snail species in relation to their importance in mangrove ecosystems. These species, and the mangrove environments that they inhabit, occur at the Southernmost global distribution limit on the South African coastline. This research project provided new and important ecological information on these snail species, as biological drivers of mangrove ecosystem functioning using a range of techniques. A stable isotope approach was used to investigate the trophic linkages and resource partitioning. Resource utilization rates were determined through *in situ* experiments; and ecological resilience was estimated by developing a mixed model to relate snail density to environmental conditions.

The results indicated that the ecological roles of mangrove gastropods are flexible; and they are significantly affected by seasonal drivers that influence resource availability. The recycling and retention of organic carbon by these species is, therefore, more complex under these conditions. This research was conducted within the iSimangaliso Wetland Park, a UNESCO World Heritage Site, allowing for important ecological questions to be investigated in ecosystems that have been minimally impacted.

The results have highlighted the importance of regional research; as South African mangrove ecosystems face unique challenges, as a result of their subtropical location and their restriction to occurring in estuarine areas. Jacqueline has already presented components of this research at two international conferences and one national conference during the course of her PhD. All five chapters of original research included in the thesis are either already published, in the press, or under review in the peer-reviewed international literature.

# **THE DEGREE OF DOCTOR OF PHILOSOPHY (OCEANOGRAPHY)**

**GAVIN MIDGLEY RISHWORTH**

**Previous qualifications:**

2010 BSc (Biological Sciences) (*cum laude*)

Nelson Mandela Metropolitan University

2011 BSc Honours (Zoology) (*cum laude*)

Nelson Mandela Metropolitan University

2013 MSc (Zoology) (*cum laude*)

Nelson Mandela Metropolitan University

**Thesis:**

*COMMUNITY STRUCTURE AND TROPHIC RELATIONS IN MARINE TUFA STROMATOLITE POOLS OF THE EASTERN CAPE*

Stromatolites were the dominant life-form at the onset of life on Earth; but they are rare in the modern oceanic environment, due to grazing pressures by metazoans, altered seawater chemistry and competition with macroalgae. Stromatolites are also thought to have played a key role during life's evolutionary history, including the production of atmospheric oxygen and their contributing to metazoan mobility. While studying the extensive stromatolite systems recently discovered along the Eastern Cape coast of South Africa, Gavin was able to make a very significant contribution to our understanding of the pressures and dynamics that these partial analogues of ancient stromatolites may have been exposed to in the distant past, especially with regard to how these may have shaped the evolutionary processes in modern metazoans.

Gavin was also able to isolate and describe some of the driving forces, which enable the extraordinary persistence of these stromatolites along South Africa's coastline, including the unique salinity and nutrient regimes, possible micro-refuge for metazoans and the non-reliance of metazoans on the stromatolite microalgae, as a food resource. All six chapters included in the thesis have now been published in high-impact journals, including one in Nature – Scientific Reports. Gavin has also presented his research at scientific conferences; and he was awarded the best-student presentation at the recent Congress of the Psychological Society of Southern Africa.

# **THE DEGREE OF DOCTOR OF PHILOSOPHY (ZOOLOGY)**

## **RABIAH RYKLIEF**

### **Previous qualifications:**

2012 MSc (Zoology)

Nelson Mandela Metropolitan University

2010 BTech (Nature Conservation)

Nelson Mandela Metropolitan University

### **Thesis:**

*GANNETS IN CONTRASTING ENVIRONMENTS: BEHAVIOUR, DEMOGRAPHICS AND INDICATORS OF ENVIRONMENTAL CHANGE*

Rabiah Ryklief investigated the behaviour and demographics of Cape gannets in two very different marine environments, in order to better understand how seabirds deal with varying environmental conditions. Using a combination of instruments deployed on study birds to track their distribution and dive behaviour, as well as nest attendance at the breeding colonies, it was clear that birds from the relatively small study colony on the west coast behaved very differently from the birds from the larger colony on the east coast. Interestingly, sea temperature and productivity (in terms of chlorophyll a) were important predictors of where gannets spend their time foraging. Hormone analyses on study birds indicated that birds from the larger colony were more stressed than birds from the smaller colony, potentially indicating that intraspecific interactions at the colony, not just prey availability, are important factors in determining stress levels.

Gannets from the east coast had a lower energy budget, in addition to a higher foraging effort, which suggests that these birds were struggling to meet their energy requirements. This was furthermore reflected in lower adult and chick body-condition indices. These findings contribute to a better understanding of population regulation in seabirds, particularly in the face of climate change.

# THE DEGREE OF DOCTOR OF PHILOSOPHY (ZOOLOGY)

**ANTON GEORGE SCHMIDT**

**Previous qualifications:**

1987 BSc  
1988 BScHons Wildlife Management  
1992 MSc Wildlife Management (*cum laude*)

University of Natal  
University of Pretoria  
University of Pretoria

**Thesis:**

*BUSH CLUMPS AS INDICATORS OF THRESHOLDS OF CHANGE IN ARID THICKET MOSAIC PIOSPHERES*

The state-and-transition conceptual model provides a theoretically robust tool to understand how ecosystems respond to stresses, indicating that the system is initially resilient to stress; but at some point a threshold is crossed and the system shifts to a new alternative stable state. This model is thus relevant to developing a predictive understanding of how the Arid Thicket Mosaic vegetation of the Little Karoo responds to herbivory by domestic livestock. For his PhD studies, Anton used this model to generate testable hypotheses of how various components of the system would respond. He identified the woody-tree dominated bush clumps as focal patches to search for evidence of stable states, which may be separated by structural and functional thresholds, as a function of intensity of herbivory.

He used four different piospheres, or gradients of herbivore pressure around water points, to assess these predicted responses; and he measured plant-structural attributes, plant-community composition, landscape-functional processes and soil features.

He was able to show that at the scale of a bush clump, a reduction in plant species richness, plant functional type diversity, succulent shrub redundancy and cover, palatable shrub cover and bush clump leaf mass below 1.5 m occurs in regions intensively used by domestic livestock. Furthermore, at the level of the landscape scale, there is a reduction in canopy-tree cover and bush-clump density. In addition to these structural threshold changes, soil nutrient cycling, soil water infiltration and soil stability thresholds are crossed at the landscape scale level.

The soil nutrient-cycling threshold is affirmed by chemical analyses of the soil. Furthermore, the keystone plant species, *Portulacaria Afra*, is unable to re-establish itself in any of the treatments. High pH and potassium levels in all the treatments, relative to the untransformed reference site, indicate that *Portulacaria Afra* (which prefers moderate soil conditions) is unlikely to re-establish itself in the study area.

His findings indicate that all the piospheres showed evidence of having crossed a transformation threshold; and they therefore represent an alternative stable state to the untransformed reference site. An additional multivariate analysis of these data supports this finding; and this further indicates that the sampling zones closest to the watering points in the most utilized treatments, have crossed a second transformation threshold. These systems are unlikely to recover to the original state without restoration.

These findings provide key insights into how the system responds; and they are necessary to develop sustainable livestock management practices. Importantly, the use of state-and-transition models and hypotheses derived from these models was also supported by the findings.



## **VISION**

**To be a dynamic African university, recognised for its leadership in generating cutting-edge knowledge for a sustainable future.**

## **MISSION**

**To offer a diverse range of quality educational opportunities that will make a critical and constructive contribution to regional, national and global sustainability.**

To achieve our vision and mission, we will ensure that:

- Our values inform and define our institutional ethos and distinctive educational purpose and philosophy.
- We are committed to promoting equity of access and opportunities so as to give students the best chance of success in their pursuit of lifelong learning and diverse educational goals.
- We provide a vibrant, stimulating and richly diverse environment that enables staff and students to reach their full potential.
- We develop graduates and diplomates to be responsible global citizens capable of critical reasoning, innovation, and adaptability.
- We create and sustain an environment that encourages and supports a vibrant research, scholarship and innovation culture.
- We engage in mutually beneficial partnerships locally, nationally and globally to enhance social, economic, and ecological sustainability.

## **VALUES**

### **i. Respect for diversity**

- We reflect and serve diverse regional, national and global communities
- We promote an open society where critical scholarship and the expression of a multiplicity of opinions and experiences are actively encouraged
- We foster an environment in which diversity is appreciated, respected and celebrated
- We are committed to accessibility, inclusivity and social justice

### **ii. Excellence**

- We promote, recognise and reward excellence in our teaching, learning, research and engagement
- We promote, recognise and reward excellent service delivery to all our stakeholders
- We provide a supportive and affirming environment that enables students and staff to reach their full potential
- We adopt innovative approaches to promote excellence in our institutional policies, structures, processes and systems

### **iii. Ubuntu**

- We are a people-centred university
- We respect the dignity of others
- We recognise our mutual interdependence
- We promote compassionate and responsible citizenship

### **iv. Integrity**

- We act with integrity and accept responsibility for our actions
- We behave in an ethical and professional manner
- We conduct our activities in an accountable and transparent manner
- We ensure the integrity of our information, systems and processes

**v. Respect for the natural environment**

- We care about the environment and recognise our responsibility to conserve, protect and properly manage natural resources for ourselves and future generations
- We promote the integration of sustainability principles into our academic practices, institutional operations and design of physical infrastructure
- We encourage mutually beneficial and sustainable approaches to community service and engagement
- We inspire students and staff to embrace environmentally friendly practices

**vi. Taking responsibility**

- We acknowledge our personal responsibility for ethical behaviour towards others
- We assume responsibility for the achievement of personal and institutional goals
- We accept responsibility for our actions and the consequences thereof
- We provide an environment that encourages students and staff to take responsibility for their academic and professional endeavours

**EDUCATIONAL PURPOSE AND PHILOSOPHY**

- We provide transformational leadership in the service of society through our teaching and learning, research and engagement activities.
  - To achieve this we are committed to developing the human potential of our staff and students in the full spectrum of its cognitive, economic, social, cultural, aesthetic and personal dimensions in the pursuit of democratic citizenship.
- We adopt a humanising pedagogical approach that respects and acknowledges diverse knowledge traditions and engages them in critical dialogue in order to nurture a participative approach to problem-posing and -solving, and the ability to contribute to a multi-cultural society.
- We inspire our stakeholders to be passionate about and respectful of an ecologically diverse and sustainable natural environment.
- We will be known for our people-centred, caring, values-driven organisational culture that will allow all members of the university community to contribute optimally to its life.

## **CONGRATULATORY MESSAGE FROM THE ALUMNI ASSOCIATION**

Congratulations on your achievement! You are now an alumnus of NMMU. We would like to take this opportunity to introduce you to the NMMU Alumni Association.

Once you have obtained your NMMU certificate, diploma or degree you become an alumnus of the university and a member of the NMMU Alumni Association. The Association is recognised by the NMMU Council as a structure of the University. The Association supports and enhances the realisation of the University's vision and mission through maintaining and expanding positive relationships with its members.

The University can be supported in a variety of ways including sharing news, expertise, skills, networks and contributions in cash and kind. Cash donations to the Alumni Fund are used to fund bursaries, projects and the NMMU Capital and Endowment Campaign. Every contribution makes a difference. Donations can be made online as well.

Join our existing alumni chapters nationally and internationally or help establish new ones to maintain and build our networks. We encourage you to remain active NMMU ambassadors.

### **The role of the Alumni Relations Office**

The Alumni Relations Office is responsible for the day-to-day management and running of the Alumni Association, the University Shop and all matters related to alumni relationship building.

We kindly request all alumni to ensure that we have your latest contact details to invite you to chapter socials and networking events as well as provide you with information regarding alumni and NMMU achievements. You are also requested to send us news regarding your or fellow alumni achievements and interesting experiences for publication in our newsletters and on the website.

Please visit our website for more information <http://alumni.nmmu.ac.za> or e-mail us at [alumni@nmmu.ac.za](mailto:alumni@nmmu.ac.za) or join our Facebook page **NMMU Alumni**. Other contact details include tel. +27 41 504 3935 and fax +27 41 504 1417. You are also most welcome to visit the Alumni Relations Centre on the North Campus in Port Elizabeth.

Remember to buy your memorabilia from the University Shop during graduation.

**We look forward to hearing from you. Stay connected to your *alma mater*!**

## **NATIONAL ANTHEM**

**Nkosi Sikelel'i-Afrika,  
Maluphakanyisw'uphondo lwayo,  
Yizwa imithandazo yethu,  
Nkosi Sikelela, thina lusapho lwayo.**

**Morena boloka setjhaba sa heso,  
O fedise dintwa le matshwenyeho.  
O se boloke, O se boloke setjhaba sa heso,  
Setjhaba sa South Africa.**

**South Africa.**

**Uit die blou van onse hemel,  
Uit die diepte van ons see.  
Oor ons ewige gebergtes  
Waar die kranse antwoord gee.**

**Sounds the call to come together,  
And united we shall stand.  
Let us live and strive for freedom,  
In South Africa our land.**