

# CENTRE FOR AFRICAN CONSERVATION ECOLOGY

## ANNUAL REPORT 2010

Nelson Mandela Metropolitan University



## INTRODUCTION

The formation of the Terrestrial Ecology Research Unit (TERU) was approved by the Council of the University of Port Elizabeth in 1991, in response to a need for terrestrial ecology training opportunities for postgraduate students and for terrestrial ecological research by conservation and environmental management agencies. TERU began operating in 1992 within the Zoology Department, and in 1997 received Council recognition as a research unit within the Faculty of Science. In 2005, TERU was registered as a Centre within the Faculty of Science of the Nelson Mandela Metropolitan University. Following an internal debate, it was agreed upon that changing the name of TERU would be an opportunity to reflect its new status as a Centre and would help identify TERU as a centre of excellence in the field of conservation and ecological research. TERU's name was changed to the *Centre for African Conservation Ecology, ACE*.

ACE comprises staff and postgraduate students of the Zoology, Botany and Geography Departments, with an Advisory Board comprising representatives of State, NGO and private conservation and environmental management interests. This is the eighteenth Annual Report, and deals with the activities of ACE during 2010.

### VISION

The Vision of ACE is to build its national and international recognition as a centre of excellence in the fields of ecological and conservation research, and postgraduate training, and to expand this role in Africa.

### MISSION

The Mission of ACE is to develop scientific knowledge of the ecology and conservation of African ecosystems, especially in the Eastern Cape and adjacent regions of high biodiversity, which will enable society to make wise environmental management decisions. In achieving its Mission, ACE will build human capacity through postgraduate training.

The mission and vision of the Centre for African Conservation Ecology is aligned with the Nelson Mandela Metropolitan University's mission and strategic directions, in the context of the fields in which ACE operates.

## DIRECTOR'S REPORT

The Centre for African Conservation Ecology has enjoyed another very productive year, although the production of referred publications declined slightly over the 2009 peak. These outputs included 16 refereed scientific publications, 4 popular articles, and 9 conference presentations. In addition 1 Hons, 6 MSc and 15 PhD students undertook their postgraduate studies under the auspices of ACE, while 4 MSc students and 1 PhD student graduated during 2010. The continued growth in PhD students is very gratifying and this should lead to an increase in publications and students graduating in the near future. This is borne out by the fact that four of these students submitted their theses for examination in 2010.

The quality of the students within ACE is again reflected in the number of awards that they received: congratulations are due to Marietjie Landman, Nokubonga Mggqatsa, Kristi Maciejewski and Linus Munishi for the various awards. In addition two of the 2010 MSc graduates, Nokubonga Mggqatsa and Manqhai Kraai were selected to enter the South African National Parks Junior Scientists programme, the only two applicants accepted in this intake.

During 2010 ACE was able to generate considerable funding once again, this exceeding R2.3 million. Although the overall income was lower than 2009 (R3 million), it is important to note that the level of bursary support nearly doubled over that of 2009. This is crucial to maintain our postgraduate student body and attract additional students. In addition, some of the funds generated in 2009 were carried over to 2010, particularly those funds earmarked for the Skead book project, hence it is clear that funding remains healthy.

A clear measure of ACE's reputation in the research field is that ACE was approached by the small-stock industry to assist in developing a Co-operative Research Programme on livestock predation by jackal and caracal. This initiative aligns very clearly with ACE's research interests and expertise, as well as our demonstrated commitment to undertake research in a collaborative fashion. The concept document developed by ACE has been well received by the stakeholders (including the national government departments of Environmental Affairs and Agriculture) and all indications are that this will be launched in 2011, with a formal Scientific Assessment being the lead activity.

Another reflection of ACE's growing reputation is the fact that ACE's field of operations is continuing to expand in Africa with projects in Namibia (livestock guard dogs), Botswana (lion/livestock interactions), Mozambique (elephant movements), Zimbabwe (soil erosion; elephant movements), Uganda (landuse changes) and Tanzania (elephant sociality). Our students also represent a broad cross section of African nations. In addition, ACE has developed strong international collaborative ties with researchers in Poland, the USA, Norway, Australia and New Zealand.

ACE has once again benefitted from the support of a broad range of individuals and entities. The Dean of the Faculty of Science, Prof Andrew Leitch, who also chairs the ACE Advisory Board, provided valuable advice and guidance. The NMMU departments of Research Management, Research Capacity Development and Finances supported ACE activities through their service input. My thanks to the numerous funding agencies and supporters who have provided the resources to make this all happen, in particular the Nelson Mandela Metropolitan University. Finally, my thanks to the staff (especially Shirley Parker-Nance and André Boshoff) and students of ACE for the generous and enthusiastic contribution that they have all made in 2010.

**Prof. G I H KERLEY**  
**DIRECTOR: CENTRE FOR AFRICAN CONSERVATION ECOLOGY**

## AWARDS

- **Marietjie Landman** was awarded a PhD Fellowship for Woman Scientist for South African Woman in Science.
- **Nokubonga Mqgatsa** received the Grassland Society of Southern Africa Award for the Best Grassland Science Student.
- **Kristine Maciejewskie** was awarded a SANPAD (South African Netherlands Research Programme on Alternatives in Development) Pre-Doctoral Scholarship in the Research Capacity Initiative Programme.
- **Linus Munishi** received joint sponsorship from the Wildlife Conservation Society and the NMMU Office for International Education for a visiting internship at the University of Washington, Seattle in the USA.
- **Graham Kerley** was appointed as a Visiting Professor at the Mammal Research Institute, Polish Academy of Sciences.

## RESEARCH ACTIVITIES

Research activities are grouped into themes, and are reported within these on a biome or project specific basis. A unifying feature of these themes is that global change serves as a cross-cutting theme.

### CONSERVATION BIOLOGY

*This theme seeks to identify priorities in terms of areas and implementation options for the efficient and effective long-term conservation of populations, species, habitats, and the ecological and evolutionary processes that maintain them.*

#### Elephant Research

Katie Gough (PhD student) is finalizing her research on the association patterns, competitive interactions and population dynamics of the Addo elephants. A major focus in 2010 was to capture and analyse her extensive data on association patterns of these elephants in relation to their within- and between-family relationships. She is to conclude her PhD in 2011.

Steve Henley joined ACE in August 2010, as a research ecologist after a six year period in the field studying elephant movements and habitat selection in and around Kruger National Park. He brings part of this research programme with him to ACE, the focus of which is how information on elephant space use can be used to assist in the development of transfrontier parks in the area where South Africa, Zimbabwe and Mozambique meet. He has also taken over responsibility for the long-term elephant study in Addo Elephant National Park now that Katie Gough is focusing on completing her Ph.D.

Linus Munishi (PhD student) is busy determining genetic and social measures of reproductive success in female elephants of the Tarangire National Park (TNP), Tanzania. He spent the first part of the year at University of Washington, Seattle. Here he attained the necessary skills and techniques in genetics to proceed for his studies. He then extracted DNA data from faecal samples of adult females from the 29 elephant family groups of TNP. The genetic results from the genotyped data show that majority of individuals within these family groups are unrelated, reflecting social disruption as a result of poaching. Based on these results, behavioural sampling (agonistic interactions) was carried out in the field (TNP) for four months to further investigate how relatedness affects social (dominance) behaviour and breeding success among individual elephant females and core groups in TNP.

### **Refugee Species**

Graham Kerley has extended his work on the refugee species concept, such species being defined as being constrained (by management or other processes) in suboptimal habitats, with consequences for their fitness and their future prospects. He has used the model of the European bison to develop and illustrate this concept and a manuscript has been submitted for publication.

Lizette Moolman (PhD student) is using the refugee species concept as a conceptual framework for her PhD study on the Knysna elephant population, with the focus on testing the hypothesis by looking at range, resource and population declines in this population. She initiated this study in 2010.

### **Cape Vulture Research**

André Boshoff has been investigating the impact of power lines on the Eastern Cape population of the threatened Cape Vulture (Griffon). During 2010 drafts of three papers were prepared or completed; these are: 1) On the role of the shape and size of foraging area, and colony size, in selecting critical areas for Cape Griffon *Gyps coprotheres* conservation action. (*Vulture News*); 2) The impact of power line-related mortality on the Cape Griffon *Gyps coprotheres* in a part of its range. (submitted to *Bird Conservation International*) and 3) Electrocution of Cape Griffons *Gyps coprotheres* on power line infrastructure: a pragmatic approach to identifying and prioritising areas for conservation action. (draft completed: to appear in *Proceedings of a Symposium on Wildlife and Energy in South Africa*, in 2011).

Two field-trips were undertaken in the Eastern Karoo and the north Eastern Cape, to monitor roosting and breeding activity at key vulture sites.

### **Cape Mountain Zebra Research**

Halska Hrabar (postdoctoral researcher) continues her postdoctoral research on Cape mountain zebra during 2010. Further data processing from field work done in 2009 was carried out in the first half of the 2010. This resulted in the submission of a manuscript entitled "Cape mountain zebra conservation goals – security in numbers?" to *Animal Conservation*. A literature review was also initiated, looking at what drives female dominance and the bias for female offspring by dominant mares in Cape mountain zebra. The second half of the year was spent collecting and processing data on the population demographics of 11 sub-populations, focusing primarily on social group composition and foal gender. These populations will be re-visited in 2011 to collect data on the next season's foals. By comparing these sub-populations, those factors affecting foal sex ratios, group size etc. will be identified. Her work received a Rufford Small Grant for Nature Conservation at the end of 2010. This will insure the continuation of her research in 2011.

### **Black Rhinoceros Research**

Andrew Stringer (PhD student, Victoria University of Wellington, New Zealand) is investigating the parasites of black rhinoceros (*Diceros bicornis*) under the supervision of ACE Research Associate Wayne Linklater. He started his PhD in February with his initial proposal and initiated fieldwork in September. While based at ACE-NMMU he successfully sampled a number of reserves in the Eastern Cape. The faecal samples were also analysed at NMMU, with surprising low diversity of parasites. Sampling will continue in other populations across South Africa in 2011.

Wayne Linklater (Research Associate) has been leading a team including Mike Knight (Research Associate) and Graham Kerley that has analysed an extensive data set of the success of black rhino translocations. The findings indicate that the relative proportion of bulls and the presence of calves strongly influence the translocation success of this species, whereas many other previously implicated factors such as reserve size and the presence of

existing populations were not supported in this analysis. This study therefore has substantial implications for the conservation management of this species.

### **Bontveld Ecosystem Conservation**

Betsie Milne (PhD student) is investigating Calcrete Bontveld landscape ecology for biodiversity conservation and resource management purposes. The leading hypothesis for the study is that Calcrete Bontveld will host discrete vegetation communities, spatial patterns, biodiversity and landscape functions, and that it should thus be viewed independently from non-calcrete thicket mosaic units. To test this she is investigating the unique patterns and trends found in Calcrete Bontveld ecosystems, and compare these to those found in non-calcrete Bontveld. The study aims to investigate vegetation dynamics, insect-, snail- and bird diversity, as well as spatial heterogeneity in Calcrete Bontveld and non-calcrete thicket mosaics. It also aims to divide Calcrete Bontveld into different disturbance regimes to understand what impact anthropogenic pressure has on Calcrete Bontveld landscape functioning. Ultimately this information will serve as a platform to provide strategies for biodiversity conservation and resource management.

### **Baakens River Valley Conservation Planning**

Adriaan Grobler (PhD student) is formulating a systematic conservation assessment and plan for the Baakens River Valley, Port Elizabeth. This valley has been identified as a priority site for conservation implementation in the Nelson Mandela Bay Municipality. Despite its situation in the centre of a major city, few studies have focused on cataloguing the biodiversity of the Valley. In order to facilitate fine-scale conservation planning, detailed information is required about the distribution of the biodiversity entities (e.g. species, vegetation communities, ecosystem processes) of an area – a requirement not currently met by broad-scale conservation plans for the region. By conducting a systematic conservation assessment, he will create a fine-scale spatial inventory of the biodiversity of the Valley and use this to inform a systematic conservation plan. This plan will make recommendations for the sustainable use and management of the Valley, and is intended for use by the Nelson Mandela Bay Municipality (NMBM) to inform decision-making regarding land-use in the Valley.

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## **ANIMAL-PLANT INTERACTIONS**

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*This theme seeks to develop an understanding of the nature of the interactions between animals and plants, and a predictive understanding of perturbations associated with animal impacts on communities and ecosystems.*

### **Feeding impacts of megaherbivores**

Marietjie Landman (PhD student) is completing her research on the resource use and implications of elephant and black rhinoceros in succulent thicket for publication. She has shown that only a small proportion of Important Plants (species of conservation concern) previously thought particularly vulnerable to elephant browsing occur in their diet and that black rhinoceros foraging opportunities are compromised by elephant browsing. The focus of this work has expanded to include the impacts of elephants and identify potential indicators of elephant-induced change on vegetation composition and structure in the Addo Elephant National Park (AENP). In particular, monitoring sites established during 1977 were re-measured as part of a fourth survey. Results are striking, showing that plant richness, volume and density continue to decline after 30 years of elephant browsing. This is most conspicuous around permanent water. This decline is associated with a loss of ecosystem functioning, eventually resulting in the collapse of the system. Similar trends have been established using remote-sensed images.

### **Thicket Elephant Interactions**

Clayton Weatherall-Thomas (PhD student) is investigating the utilization thresholds for maintaining floral diversity in Thicket habitats. In 2010 he completed his initial sampling in the Colchester section of the Addo Elephant National Park. In this area he has set up permanent transects to study the impact of a newly introduced population of elephants on the composition and structure of Thicket vegetation.

Janis Smith (MSc student) is assessing temporal and spatial trends in thicket degradation by elephants within the Addo Elephant National Park, using multi-temporal satellite imagery. She will compare remote-sensed data over time and space to assess patterns in vegetation change. In 2010 she focused on identifying her study locations, and has accumulated an impressive set of data for a variety of locations with different histories of elephant use in the park.

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## **RESOURCE ECOLOGY**

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*This theme seeks to develop a predictive understanding of the responses of biota to different forms of utilization, and of how these natural resources are utilized.*

Many of the projects listed under other themes also contribute towards the goals of this theme.

### **Valuing biodiversity for ecotourism**

Kristine Maciejewski (PhD student) addresses the value of biodiversity for ecotourism in her project. The year was mostly dedicated to field work where the value of biodiversity, which is typically regarded as an “unpriced good”, was derived from various aspects using ecotourism as a tool, focusing on the motivation behind tourism. The landscape use of ecotourism operations was analysed in this study to determine what landscape features serve as a tourist attraction. Various private reserves within the Eastern Cape were selected as study sites where tracking devices were installed into the game viewing vehicles. These anti-car theft tracking devices, sponsored by Altech Netstar were programmed to record the daily movement patterns of the game viewing vehicles to measure the use of the reserves in space and time. The value that tourists place in different aspects of ecotourism was also studied by using Shamwari Private Game Reserve as a case study to determine what value tourists place in various large mammal species. Using participant observation techniques she accompanied the tourists on game drives, measuring various parameters at each animal sighting to determine whether a preference exists between various species. This will be applied to the evaluation of the relative costs and benefits of wildlife species to address the hypotheses around the value of introducing non-indigenous species into reserves. This in turn will be used to develop an optimal wildlife density/tourism value response curve which will be used to explore specific questions such as the role of the presence of juveniles in contributing to the value of wildlife viewing.

A key outcome of this project is to quantify the value biodiversity for ecotourism. This will be a global first and the project outcomes will directly influence policy and practices of state and private conservation entities. The information obtained through this study will be used to liaise with the wildlife industry in the Eastern Cape to strengthen the understanding of and commitment to a sustainable future through the triple bottom line.

### **Predator-livestock interactions**

André Boshoff compiled a document entitled “*A Concept framework for a co-operative stock predation research programme in South Africa*” at the request of the small livestock industry, and this is being used to develop a co-ordinated approach to undertake a focused and strategic research programme on the problems around predation on livestock by especially jackal and caracal. The overall goals of this programme are to assist in investigating ways to manage, in an environmentally sustainable and cost-effective manner, the relationships

between medium to small mammalian predators and small-stock. Arising from this concept framework has been a proposal to undertake a formal Scientific Assessment of predation on livestock, and funding will be sought for this.

### **Livestock Guarding Dogs**

Gail Potgieter (MSc student) is assessing the effectiveness of livestock guarding dogs, focusing on their individual performance and how this changes over their lives. She is also investigating how the dogs may be influence the impacts of predator control on biodiversity. She is working in Namibia with the Cheetah Conservation Fund

### **Lion-human conflict in Botswana**

Gosiame Neo-Mahupeleng's (PhD student) project looks at the interactions between the large predators (lion and spotted hyena) in the Chobe district of Botswana. In 2010 he has been concentrating on fieldwork. He has collected a large database on such conflict incidents, as well as extensive data on husbandry practices as they pertain to predation management. Collaring the large predators is ongoing, and he will soon have extensive spatial data for these species in his area.

### **Tree/Grass interactions**

Neels De Ridder (PhD Botany) has initiated a study to examine the effects of *Acacia karroo* tree density on grass species composition, forage yield and quality in the different rainfall regimes in the Eastern Cape region. This study is almost complete and is indicating interesting effects of shade and focus enrichment.

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## **PREDATOR PREY INTERACTIONS**

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*This theme seeks to understand the nature and consequences of predator prey interactions, to provide guidelines for the management of predators and their prey.*

### **Carnivore-Buffalo interactions**

Craig Tambling (Postdoctoral research) was awarded an NRF Post Doctoral Fellowship and continued his monitoring the impact that reintroduced carnivores have on buffalo in Addo Elephant National Park Main Camp Section (Providing a monthly report on research findings to SANParks). His studies also include a camera trap study investigating the impact that removing fences has on the fauna in the Colchester Section of Addo Elephant National Park. He initiated a large scale long term jackal diet project in April 2010 that incorporates seven different sites in the SANParks Frontier Cluster (Addo Elephant, Mountain Zebra, Camdeboo and Karoo National Parks). His research has enabled him to presented data on population growth rates of larger ungulates of the Addo Elephant National Park at the South African Wildlife Management Association Annual Symposium. He has presented the Addo Elephant National Park Main Camp research to the Honorary Rangers at their May monthly meeting. His research resulted in one scientific paper (in *Oryx*) in 2010.

### **Shifting carnivore diets**

Julia Wentworth (MSc student) has accumulated a long term data set (since their reintroduction in 2003) on the diets of lions and spotted hyaenas in the Addo Elephant National Park, and is exploring how these may change overtime as the prey base changes.



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## TRANSFORMATION AND RESTORATION ECOLOGY

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*This theme seeks to understand the causes and consequences of ecosystem transformation across all levels of integration, to provide guidelines for the restoration of biodiversity and ecosystem function.*

### **Rehabilitation of Thicket**

Merika Louw (MSc student) has completed data collection on the stress physiology of thicket species. There are interesting comparisons with spekboom and once the statistical analysis is completed it is expected that there will be some ecophysiological explanation for the lack of success of species other than *Portulacaria afra* in rehabilitation efforts.

### **Rehabilitation of Bontveld**

Roy De Kock (MSc student) has designed a protocol for Bushclump rehabilitation of Grassridge Bontveld after strip mining. His MSc was considered one of the best seen by the external examiner. Two papers are in preparation from this study.

### **Soil carbon sequestration potential**

Rebecca Zengeni (PhD student) is assessing the capacity of soil to sequester carbon in the wake of climate change. This is done by quantifying carbon pools and fluxes within different soils, under different land-use/cover types, management options. An ACE Soil CO<sub>2</sub> Flux system has been purchased and soil gaseous emissions will be measured for carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and Nitrous oxide (N<sub>2</sub>O).

### **Thicket woodland**

Adolph Nyamugama, (PhD student) is analyzing land use/cover change over the past 35 years in the thicket woodlands of the Great Fish River Game Reserve Complex and surrounding communal areas. Using Remote Sensing, field spectrometry and GIS, he is in the process of modelling the impact of land use/cover changes on soil organic carbon in the subtropical thicket.

### **Factors influencing ecological thresholds in Mosaic Thicket**

Anton Schmidt (PhD student) made good progress on his study on the effects of herbivory on transformation in Arid Mosaic Thicket of the southern Cape, and was able to undertake extensive fieldwork during a break from his lecturing responsibilities at the Saasveld campus.

### **Soil loss and land use**

P. Mhangara (PhD student) has submitted his thesis wherein he investigated land use/cover trends, and modelled the spatial patterns of soil loss and thereby predicted future land use/cover scenarios in the Keiskamma catchment of the Eastern Cape Province.

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## BIODIVERSITY

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*This theme seeks to gain a predictive understanding of the patterns, determinants and functions of biodiversity.*

**Second Edition of CJ Skead's book on the historical distribution of the larger mammals in the Eastern Cape (first published in 1987):** Following a successful fund-raising initiative, the project to prepare and publish a Second Edition of CJ Skead's volume on the historical incidence of the mammals of the Western and Northern Cape (First Edition published in 1980) with André Boshoff as lead editor and Graham Kerley and Peter Lloyd (Cape Nature) as co-editors, continued through the year. Briefly, the work focused on a continued search for new information and the writing of new text, and also the addition of

historical distribution maps, numerous illustrations and a fully revised index. Financial support was provided by a range of sponsors: Hoheisen Charitable Trust; Rupert Nature Foundation; National Lottery Distribution Trust Fund; National Research Foundation; Table Mountain Fund/WWF-SA; ACE; Ernest Oppenheimer & Son/Tswalu Kalahari Reserve; Plant Conservation Unit (UCT); Mrs June Stannard. The final copy is expected to be sent to the printer in January 2011.

## SCIENCE MANAGEMENT

ACE staff and students contributed to Science Management through a number of activities. These included:

- André Boshoff was invited to be a member of BirdLife South Africa's Conservation Committee; he participated in two meetings, in Cape Town.
- Graham Kerley served on the editorial boards of the Journal of Arid Environments, African Zoology, African Journal of Range and Forage Sciences, South African Journal of Wildlife Research. He also reviewed proposals for the National Geographic Society, Wageningen University and the Claude Leon Foundation.
- Staff and students served as manuscript reviewers for the following journals: *Acta Theriologica*, *African Zoology*, *African Journal of Ecology*, *African Journal of Range and Forage Science*, *Biodiversity & Conservation*, *Biological Conservation*, *Ecography*, *Ecological Research*, *Koedoe*, *Journal of Arid Environments*, *Journal of Mammalogy*, *Journal of Zoology, Lond.*,

## COMMUNITY SERVICE

- Graham Kerley serves as a member of the Board of Directors of South African National Parks.
- André Boshoff participated in a live broadcast of the programme Science Matters on SABC 3; the topic of discussion was the value and use of historical mammal distribution data. He also shared his work and results in a talk on Cape Vulture conservation presented to a special interest group (of adults), at Clarendon Park Junior School, Port Elizabeth.
- ACE continued to operate the Grysbok Environmental Education Trail, with nearly 1000 school-level learners participating in the trail experience in 2010.
- ACE operated a stall at the SciFest in Grahamstown in April, over 40 000 learners attended this event.

## EXTERNAL STUDENT SUPERVISION

ACE members served as supervisors for students registered at universities besides the Nelson Mandela Metropolitan University, reflecting the levels of collaboration being achieved. These included:

- PLOTZ, R. The reproductive performance and ecology of black rhinoceros, *Diceros bicornis minor*. PhD thesis, Victoria University of Wellington, NZ, with co-supervision by Graham Kerley.
- STEERS, K. Competitive behavior in goats. MSc thesis, University of Kwazulu-Natal, with co-supervision by Graham Kerley.

## 2010 Products

### Refereed Scientific Publications

1. BERKELEY, E. V, & LINKLATER, W. L. 2010. Annual and seasonal rainfall may influence progeny sex ration in the black rhinoceros. *South African Journal of Wildlife Research* 40(1): 53-57.
2. BOSHOFF, A.F. & KERLEY, G.I.H. 2010. Historical Mammal Distribution Data: How Reliable are Written Records? *South African Journal of Science* 106 (1/2):1-8.
3. FEELEY, J.M. 2010. On the southeastern range limits of the Nile crocodile: a review of its past and present occurrences in the Eastern Cape and Western Cape, South Africa. *South African Journal of Wildlife Research* 40:169-175.
4. HAYWARD, M.W., HAYWARD, G.J. & KERLEY, G.I.H. 2010 The impact of upgrading roads on the conservation of the threatened flightless dung beetle, *Circellum bacchus* (F.) (Coleoptera: Scarabaeidae). *The Coleopterists Bulletin* 64(1):75-80.
5. HAYWARD, M.W. & HAYWARD, G.J. 2010. Potential amplification of territorial advertisement markings by black-backed jackals (*Canis mesomelas*). *Behaviour* 147: 979-992.
6. KERLEY, G.I.H. & LANDMAN, M. 2010. Measuring the impact of indigenous herbivores: putting Hoffman *et al.* (2009) into a broader perspective. *Afr. J. Range & Forage Sci.* 27:179-180.
7. KERLEY, G.I.H., LANDMAN, M., DE BEER, S. 2010. How do small browsers respond to resource changes? Dietary response of the Cape grysbok to clearing alien Acacias. *Functional Ecology* 24(3): 670-675.
8. LINKLATER W. 2010. Distress - an underutilised concept in conservation and missing from Busch and Hayward (2009). *Biological Conservation*, 143: 1037-1038.
9. LINKLATER, W. L. & GEDIR, J. V. 2010 Distress unites animal conservation and welfare towards synthesis and collaboration. *Animal Conservation* 14 (1): 25-27
10. LINKLATER, W. L. & HUTCHINSON, I. 2010 Black rhinoceros are slow to colonize a harvested neighbour's range. *South African Journal of Wildlife Research* 40(1):58-63.
11. LINKLATER, W. L., MACDONALD, E., FLAMAND, J. & CZEKALA, N. 2010 Declining and low fecal corticoids are associated with distress, not acclimation to stress, during the translocation of African rhinoceros. *Animal Conservation*, 13: 104–111.
12. LINKLATER, W., PLOTZ, R., KERLEY, G.I.H., BRASHERES, J.S., LENT, P., CAMERON, E.Z., LAW, P. & HITCHINS, P. 2010 Dissimilar home range estimates for black rhinoceros (*Diceros bicornis*) can not be used to infer habitat change. *Oryx* 44(1):16-18.
13. MUGAGGA, F., BUYINZA, M & KAKEMBO V., 2010. Livelihood Diversification Strategies and Soil Erosion on Mount Elgon, Eastern Uganda: A socio-Economic Perspective. *Environmental Research Journal*. 4 (4) 272-280.
14. NKONGOLO, N.V., HATANO, R. & KAKEMBO, V. 2010. Diffusivity Models and greenhouse Gases Fluxes from a Forest, Pasture, Grassland and Corn Field in Northern Hokkaido, *Pedosphere* 20(6):747-760.
15. ODINDI, O. J. & KAKEMBO, V. 2010. The hydrological response of *Pteronia incana* invaded areas in the Eastern Cape Province, South Africa. *Ecohydrology*. DOI: 10.1002/eco.180.
16. SIMELANE, T.S. 2010. Impacts of traditional land uses on biodiversity outside conservation areas: effects on dung beetle communities of Vaalbos National Park. *African Journal of Ecology* 48(2): 490-501.

### Popular Articles

1. KERLEY, G.I.H. 2010. The Royal Polish Bison Hunts. *Magnum* August: 23-25.
2. HRABAR, H. & KERLEY, G.I.H. 2010 Cape mountain zebra conservation – on the road to success? *Environment* 4:38-41.
3. BOSHOFF, A.F. 2010. Where have all the eagles gone? *Bee-eater* 61: 106-108.
4. BOSHOFF, A. & MINNIE, J. 2010. On the role of the shape and size of foraging area, and colony size, in selecting critical areas for Cape Griffon *Gyps coprotheres* conservation action. *Vulture News* 61:00-00.

### Conference Presentations

1. KERLEY, G.I.H. Science and the evidence-based management of megaherbivores: from elephants to bison. **Invited Oral presentation.** Conservation of the European bison in the Białowieża Forest. 25-27 February 2010, Białowieża, Poland.
2. MGQATSA, N., KERLEY, G.I.H. & LANDMAN, M. Diet and feeding ecology of common warthog in the Addo Elephant National Park. Oral presentation, Grassland Society of Southern African Annual Congress. Kimberley, July.

3. KOWALCZYK, R., KERLEY, G.I.H. & CROMSIGHT, J. The European bison - king of the forest or refugee in a marginal habitat? Oral presentation, Workshop on the role of mammalian herbivores in shaping woody plant communities, 11 - 15 October 2010, Białowieża, Poland
4. KERLEY, G.I.H., TAMBLING, C.J. & LANDMAN, M. Buffalo responses to lion- integrating demographic, behavioural, resource availability and foraging responses. Oral presentation, Workshop on the role of mammalian herbivores in shaping woody plant communities, 11 - 15 October 2010, Białowieża, Poland.
5. TAMBLING, C.J., ADENDORF, J. & KERLEY, G.I.H. Population trends of the larger mammals in the Addo Elephant National Park Main Camp Section, Eastern Cape. Oral Presentation, South African Wildlife Management Association Symposium, 19 - 22 September 2010, Marikana, North West Province, South Africa.
6. MACIEJEWSKI, K. & KERLEY, G.I.H. Tracking landscape-level use in protected areas in the Eastern Cape. Oral Presentation, South African Wildlife Management Association Symposium, 19 - 22 September 2010, Marikana, North West Province, South Africa.
7. MUGAGGA, F & KAKEMBO, V. Land use change on the fragile slopes of Mt Elgon and its implications for landslide occurrence. Paper presented at the Southern African Association of Geomorphologists Conference (SAAG), Rhodes University, Grahamstown, 3-5 September, 2010.
8. KAKEMBO, V. & MUGAGGA, F. An assessment of soil properties and topographic attributes of major landslide sites on Mount Elgon slopes, eastern Uganda. Paper presented at the Southern African Association of Geomorphologists Conference (SAAG), Rhodes University, Grahamstown, 3-5 September, 2010.
9. CAMMERAAT, E., KAKEMBO, V. & WEISS, N. Changing ecohydrological and geomorphological processes under invasion of blue bush in SE South Africa. Paper presented at the Southern African Association of Geomorphologists Conference (SAAG), Rhodes University, Grahamstown, 3-5 September, 2010.

## **POST-GRADUATE TRAINING**

### **Honours students**

1. Huff, A. The Grysbok Environmental Education Trail. Unpublished Hons Project, Nelson Mandela Metropolitan University

### **Postgraduate degrees completed – M.Sc.**

1. KIETZMANN, M. Ecological correlates of nasal turbinate structure and function. MSc dissertation, Nelson Mandela Metropolitan University.
2. KRAAI, M. White rhinoceros as a subsidised invasive species in the Eastern Cape: population establishment and identifying plants at risk. MSc dissertation, Nelson Mandela Metropolitan University.
3. MGQATSA, N. Population growth and impact of warthog in the Addo Elephant National Park. MSc dissertation, Nelson Mandela Metropolitan University.
4. NDLELA, S. 2010 Trends in vegetation patchiness loss and implications for landscape function: the case of *Pteronia incana* invader species in Ngqushwa District, Eastern Cape. MSc dissertation, Nelson Mandela Metropolitan University. (Awarded *Cum Laude*).

### **Postgraduate degrees completed – PhD**

1. ODINDI, J.O. The invasion of *Pteronia incana* (Blue bush) along a range of gradients in the Eastern Cape Province: It's spectral characteristics and implications for soil moisture flux. PhD thesis, Nelson Mandela Metropolitan University.

### **Postgraduate degrees in progress – M.Sc.**

1. HAINDONGO, P. An investigation of the factors influencing vegetation stress in a section of the Keiskamma Catchment, Eastern Cape. MSc dissertation, Nelson Mandela Metropolitan University.
2. LOUW, M. The propagation and ecophysiology of thicket species: in contribution to rehabilitation of Eastern Cape thickets. MSc dissertation, Nelson Mandela Metropolitan University.
3. POTGIETER, G. Effectiveness of livestock guarding dogs. MSc dissertation, Nelson Mandela Metropolitan University.
4. SMITH, J. Using remote-sensing to assess elephant-induced vegetation change in the Addo Elephant National Park. MSc dissertation, Nelson Mandela Metropolitan University.
5. WENTWORTH, J. Diet shifts and overlaps of lion and spotted hyaena in the Addo Elephant National Park. MSc dissertation, Nelson Mandela Metropolitan University.

6. XANGA, W.W. The relationship between land use, sediment delivery and hillslope form in Ngqushwa (formerly Peddie) district, Eastern Cape. MSc dissertation, Nelson Mandela Metropolitan University.

**Postgraduate degrees in progress – Ph.D.**

1. GOUGH, K.F. Association patterns of elephants: do behavioural patterns reflect genetic relationships? PhD thesis, University Nelson Mandela Metropolitan University.
2. LANDMAN, M. Megaherbivores in succulent thicket: resource use and implications. PhD. thesis, Nelson Mandela Metropolitan University.
3. MACIEJEWSKI, K. Valuing biodiversity for ecotourism. PhD thesis, Nelson Mandela Metropolitan University.
4. MANJORO, M. Modelling the impact of land cover/land use change on soil erosion in the communal areas of Mashonaland Central Province, Zimbabwe. PhD thesis, Nelson Mandela Metropolitan University.
5. MHANGARA, P. 2010. Land use/cover change modeling and land degradation assessment in the Keiskamma catchment using remote sensing and GIS. Unpublished PhD thesis, Nelson Mandela Metropolitan University.
6. MILNE, E. Bontveld Ecosystem Conservation: Proposing land use practices that will maintain rarity and spatial patterns on unaltered geomorphologic profiles
7. MOOLMAN, L. The Knysna elephants as a refugee species. PhD thesis, Nelson Mandela Metropolitan University.
8. MUGAGGA, F. 2010. Land use change, landslide occurrence and livelihood strategies on Mount Elgon slopes, Eastern Uganda. Unpublished PhD thesis, Nelson Mandela Metropolitan University.
9. MUNISHI, L. Elephant social interactions, Tarangire National Park, Tanzania. PhD thesis, Nelson Mandela Metropolitan University.
10. NEO-MAHUPELENG, G. Lion human interactions in the Chobe District Botswana. PhD thesis, Nelson Mandela Metropolitan University.
11. NKONGOLO, N.V. 2010. Quantification of greenhouse gas fluxes from soil in agricultural fields. Unpublished PhD thesis, Nelson Mandela Metropolitan University.
12. NYAMUGAMA, A. Modeling the impact of land use/cover change and its impact on soil organic carbon in the Thicket Biome of Southern Africa. PhD thesis, Nelson Mandela Metropolitan University.
13. SCHMIDT, A.G. Factors affecting ecological thresholds in Mosaic Thicket. PhD thesis, Nelson Mandela Metropolitan University.
14. WEATHERALL-THOMAS, C.R. Utilization thresholds for the maintenance of thicket floral diversity. PhD thesis, Nelson Mandela Metropolitan University.
15. ZENGENI, R. Assessing the potential of soil carbon sequestration as a climate change mitigatory option in the Eastern Cape Province of South Africa, PhD thesis, Nelson Mandela Metropolitan University.

## FINANCIAL SUPPORT 2010

Research Grants	Programme	Amount (R)
National Research Foundation	Incentive Funding (Kerley)	28 000
National Research Foundation*	Valuing Biodiversity	295 525
NMMU	Valuing Biodiversity	96 000
National Research Foundation	Predators (Tambling)	10 000
Table Mountain Fund	Leopard-Stockfarmer interactions	10 000
Rufford Small Grants Foundation	Cape Mountain Zebra	55 146
Distell	Addo Elephants	55 000
National Lottery Distribution Trust Fund	Historical mammal distribution	478 800
NMMU Research Office	G Kerley, W Linklater	154 690
US Fish and Wildlife Assistance	Kruger North Elephants	245 226
Award/Save the Elephant Foundation		
NMMU	ACE operations	30 000
Victoria University of Wellington	Black rhino conservation biology	25 200
<b>Research Grants total</b>		<b>1 483 587</b>
<b>Contract research (various) total</b>		<b>30 573</b>
<b>Grysbok Trail (various) total</b>		<b>16 880</b>
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<b>Bursary Support</b>	Recipients	
NMMU	K Maciejewski, J Wentworth, G Potgieter, L Moolman, A. Grobler, B. Milne, C Weatherall-Thomas, L Munishi, H Hrabar	381 000
National Research Foundation	A Grobler, C Tambling	160 000
Table Mountain Fund	A Grobler	9 000
Department of Science & Technology	M Landman	75 000
Wildlife Conservation Society	L Munishi	148 800
African Wildlife Foundation	G Neo-Mahupeleng	16 500
Dormehl-Cunningham	M Louw	10 000
<b>Bursary Support total</b>		<b>809 300</b>
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<b>TOTAL</b>		<b>2 340 340</b>

### In Kind Contributions

- The Mazda Wildlife Fund continues to provide a fully-serviced 4x4 twincab for research support. This is valued at about R50 000 per year.
- Budget Rent-a-Car have again provided a 4x4 bakkie, which has primarily been used for research on predators in the Addo Elephant National Park. This is valued at about R50 000 per year.
- Altech Netstar provided and installed 30 vehicle tracking devices for the purposes of monitoring landscape use by tourists undertaking gameviewing. This is valued at about R300 000.

\*Includes bursary amounts

## ADVISORY BOARD, STAFF AND ASSOCIATED STUDENTS

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Mr Cornelius Pietersen	AGRI EC
Mr Frank Mazibuko	National Research Foundation
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Mr Matthew Norval	Wilderness Foundation
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Dr William Fowlds	Indalo: Eastern Cape Association of Private Reserves

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Dr MW Hayward (Aus)	Dr M H Knight (SA)
Dr S Holness (SA)	

### Postdoctoral Researchers

Dr H Hrabar	Dr C Tambling
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### Postgraduate students (and their academic departments)

MSc		PhD	
Ms Janis Smith	Geosciences	Ms K Gough	Zoology
Ms M Louw	Botany	Ms M Landman	Zoology
Ms J Wentworth	Zoology	Ms K Maciejewski	Zoology
Mr R De Kock	Botany	Mr P Mhangara	Geosciences
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Ms G Potgieter	Zoology	Mr L Munishi	Zoology
		Mr N Nkongolo	Geosciences
		Mr G Neo-Mahapeleng	Zoology
		Mr A Nyamugama	Geosciences
		Mr A Schmidt	Zoology
		Mr C Weatherall-Thomas	Botany
		Ms R Zengeni	Geosciences
		Mr N De Ridder	Botany
		Ms B Milne	Botany
		Ms L Moolman	Zoology

### External Students

Mr R Plotz	Victoria University of Wellington (PhD)	Mr K Steers	University of Kwazulu-Natal (MSc)
Mr A Stringer	Victoria University of Wellington (PhD)		