

CENTRE FOR AFRICAN CONSERVATION ECOLOGY

ANNUAL REPORT 2011

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 Geosciences Departments, with an Advisory Board comprising representatives of State, NGO and private conservation and environmental management interests. This is the nineteenth Annual Report, and deals with the activities of ACE during 2011.

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 are 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

During 2011, the Centre for African Conservation Ecology has again made excellent progress towards its overall goals of increasing the scientific understanding of the ecology and conservation of African ecosystems, and the training of postgraduate students who will become leaders in this field. This is clearly demonstrated by the increase in refereed scientific publications (a record 24 papers, up from 16 in 2010), and the high number of conference presentations (28, of which many were invited and/or at international conferences). The decline in popular articles (2 in 2011 compared with 4 in 2010) is disappointing, given ACE's commitment to making research findings available to the general public. This is however tempered by the publication of the second revised edition of Skead's work on the historical distribution of larger mammals, this being focused on the Western and Northern Cape provinces. This is truly a flagship product of which ACE and the NMMU can be proud, and it will have far reaching impacts on the understanding and management of biodiversity in this area. On the student side there is also strong growth, with 2 Honours, 16 MSc and 16 PhD students (1, 6, and 15, respectively, in 2010) undertaking their research under the auspices of ACE. Furthermore, 1 MSc and 3 PhD students graduated in 2011, and these students are to be congratulated. As indicated in the body of this report, many of the current group of students are on track to complete their studies in 2012. It is also notable that among the postgraduate students listed below, about half have been attracted to NMMU from other universities. This highlights the reputation that ACE enjoys.

ACE continues to be financially robust, attracting considerable research funding (R1.3 million in 2011). This figure does not include all of the bursaries that ACE students attract, these bursary totals being difficult to reliably identify. As the financial statements indicate, ACE is highly efficient in focusing funds on the core business of research and training, with only about 7% being directed towards running the Centre itself. In addition, ACE is in a strong financial position, with substantial funds carried forward to this year. These figures do however not provide room for complacency, as it remains a challenge to attract funds for the running of ACE as opposed to project funding. The successful launching of a few large-scale projects that attract substantial funds is therefore critical for ACE's success into the future.

The year 2011 marks the end of the 5-year planning phase for the ACE Strategic Framework (2007-2011), and during the year, this framework and ACE's progress towards achieving its Vision were subject to an internal review. The outcome of this was a sense of success in achieving the Vision and a reformulated ACE Strategic Framework for the next five years (2012-2016). We within ACE look forward with considerable enthusiasm to applying this new framework to achieving our goals.

Increasing the ACE research capacity has been a key aspect of the Strategic Framework, and during 2011 three positive steps were made in this regard. Firstly, it is a pleasure to welcome Drs Kwezi Mzilikazi and Gideon Rossouw to membership of the Centre. Secondly, the number of Research Associates has now increased to six (see the list below), and this is positively reflected in the contribution to the research output. Finally, it is important to recognize the value of Postdoctoral Researchers, with two such postdocs currently on the team.

During 2011, ACE has 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 made in 2011.

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

AWARDS

The following students and staff received awards in 2011:

- Hayley Clements - won the prize for Best Poster at South African Wildlife Management Association Annual Symposium
- Marietjie Landman - shared the prize for the Best Presentation at the NMMU Zoology Department Annual Symposium.
- Graham Kerley - presented the Inaugural CJ Skead Memorial Lecture, Grahamstown, May 2011.
- Sinenhlanhla Ndlela – was awarded the Grassland of Southern Africa Best Grassland Student Award at the Nelson Mandela Metropolitan University.

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

The work on monitoring the Addo elephant population has continued with Steve Henley focussing on detecting demographic shifts in this population, for which ACE now has 80 years of demographic data. This therefore represents one of the best studied large mammal populations in the world and the only elephant population for which long term demographic data exceeds the lifespan of an elephant. Steve has shown that the trend in the tusklessness of females has reversed subsequent to the introduction of additional bulls from the Kruger population. This is important phenotypic evidence of the success of this genetic intervention. Katie Gough is still grappling with the analyses of social interactions of the Addo elephants for her PhD and she has shown that there is no evidence for inbreeding avoidance in terms of the association patterns of the elephants with their natal family groups.

Linus Munishi has made excellent progress on his PhD study of the consequences of poaching on the social organization and demographics of the Tarangire elephants in Tanzania. His findings show that (1) poaching leads to disrupted social structures, with some surviving family groups being made up of unrelated individuals (2) this leads to increased levels of aggression within family groups that have lower relatedness than non-disrupted (closely related) family groups (3) and this further leads to a decline in the reproductive output of surviving females in such disrupted groups, but (4) this reduced reproduction does not extend to the offspring of these poached elephants. This last result may reflect the increased resources available to the survivors which then benefit from a relaxation in density dependence. Linus's work adds considerably to our understanding of social interactions in elephants as well as the demographic and genetic consequences of poaching. Linus submitted his PhD for examination at the end of the year.

Refugee Species

Graham Kerley finalised a manuscript that sets out the refugee species concept and this has now been accepted for publication. He has been working with colleagues from Poland and Sweden on a follow-up paper that sets out some of the risks associated with using distribution data for modelling conservation opportunities if the focal species have suffered a loss of preferred habitat and are thus refugee species.

Lizette Moolman (PhD student) has further developed her study around the Knysna elephants as refugee species and presented her initial findings at a conference in September. She is focussing on locating historical and museum material relevant to this population.

Leopards in the Baviaanskloof

Liaan Minnie continued surveying the leopard population in the Baviaanskloof Mega-Reserve (BMR), funded by the Table Mountain Fund. This consisted of running camera trap surveys on privately owned farms in the BMR. The project recorded 10 336 images, of which 13 were of leopards. This project further strengthened the good relationships between ACE and private landowners in the BMR.

Cape Vulture Research

During 2011 André Boshoff published two research papers, based on his work on the impact of power line infrastructure on the Eastern Cape population of the threatened Cape (Griffon) Vulture. A field-trip to the North-eastern Cape (Lady Grey district) was undertaken in June 2011, to monitor roosting and breeding activity at the Kammelspruit Gorge Cape Vulture colony. Owing to the threat of disturbance to this colony, sponsorship was obtained from Sasol, through the Bird of Prey Programme of the Endangered Wildlife Trust, to prepare and erect two signboards that indicate the plight of the Cape Vulture in general, the importance of protecting this colony and the need to avoid disturbance of any kind.

Cape Mountain Zebra Research

Halska Hrabar (postdoctoral researcher) has written up her survey of the Cape Mountain Zebra status and this manuscript has been accepted for publication. She has been collecting further data on reproduction in selected populations, with the aim of exploring the drivers of biases in the sex ratio at birth. In addition she has started to explore the genealogy data of the "Quagga Project" to ascertain the level of inbreeding in the founder population.

Black Rhinoceros Research

Andrew Stringer (PhD student, Victoria University of Wellington, New Zealand) has been collecting data on parasites in black rhino, this being a poorly understood aspect of rhino conservation. He has successfully sampled a large number of populations and initial analyses suggest that the incidence of parasitism is not random. Diane Smith supported this work in her Hons (Zoology) project, by estimating the number of faecal samples required to estimate parasite prevalence and abundance.

Wayne Linklater (Research Associate) has successfully completed an analysis of a comprehensive database on black rhino introductions and shown that the success of such reintroductions is dependent on the dominance of adult males and the presence of juveniles in the reintroduction group. This work substantially revises the previous understanding of the factors behind the success of black rhino reintroductions.

Bontveld Ecosystem Conservation

Betsie Meyer-Milne (PhD student) is investigating and comparing plant phytosociology, biodiversity and spatial patterns between Calcrete Bontveld and other similar thicket mosaic units, with the aim to determine the cause of rarity and endemism in Calcrete Bontveld, and to develop strategies for biodiversity conservation and resource management. She conducted vegetation, soil and invertebrate sampling in the first quarter of the year, and spent the rest of the year analysing and sorting the samples in the lab. She also compiled a spider photo reference collection and evaluated environmental variables for the different sites.

Baakens River Valley Conservation Planning

Adriaan Grobler (MSc student) is conducting a systematic conservation assessment of the Baakens River Valley, based on a fine-scale spatial inventory of the biodiversity in the Valley. He found that the Valley supported a diversity of ecosystems, including two thicket vegetation types and four fynbos vegetation types. It also provides habitats for 11 threatened plant species. The biodiversity in the Valley is endangered by a number of threatening processes and close to 70% of the land has been irreversibly transformed, primarily by urban expansion and invasive alien plants. The establishment of the notional conservation system identified in this study and the active rehabilitation of degraded land will ensure the persistence of biodiversity in the Baakens River Valley. Adriaan submitted his MSc for examination at the end of the year.

ANIMAL-PLANT INTERACTIONS

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.

Impacts of megaherbivores

Marietjie Landman (PhD student) has completed her research on the resource use and implications of elephant and black rhinoceros in succulent thicket and is preparing this work for publication. She showed that (1) only a small proportion of plants thought to be particularly vulnerable to elephant browsing disappears because of elephant herbivory, suggesting that alternative mechanisms may be responsible for their decline. (2) elephant effects intensify in the vicinity of water, but vary between the structural and functional features of the system. She predicts that elephant have the ability to cause severe degradation in succulent thicket habitats with abundant water supply and elevated elephant numbers, which needs to be recognized and managed. This work further shows that elephant piosphere effects are complex, such that a more integrated understanding of the impacts on ecological heterogeneity may be required before water availability is used as a tool to manage impacts. (3) using 31 years of data on the structure of the canopy shrubs in the Addo Elephant National Park, and a unique experimental design, Marietjie further quantified elephant impacts on the thicket shrub community and contrasted these among elements of this community: from community composition and structure to the structure of individual canopy species. She demonstrates the importance of explicitly recognizing biodiversity and heterogeneity for the conservation management of elephant. This work contributes significantly toward recognizing the scale of the impacts for monitoring, which is considered fundamental to preventing a mismatch at the management scale. (4) the consequences of elephant impact on co-occurring browsing megaherbivores. She showed that elephant and black rhinoceros may compete for resources at high elephant densities, which cause rhinoceros to shift their diet along the browse-grass continuum. Opposing this competitive relationship, however, elephant pathways initially facilitate access to habitat and food for herbivores in otherwise impenetrable thicket. This suggests that these community processes are not mutually exclusive, but that their relative importance for rhinoceros (and other browsers) foraging varies with the intensity of elephant utilization.

Given the extensive effects of elephant on biodiversity in succulent thicket shown above, these impacts could cause irreversible ecosystem shifts. Thus, to identify thresholds of ecosystem change, measurable indicators are required that caution management of impending changes. However, these thresholds are difficult to discern and suitable indicators are poorly understood. Thus, the work of Landman was expanded to (1) evaluate the utility and sensitivity of stakeholder-values in informing the quantitative Thresholds of Potential Concern approach in ecosystems with elephant, and (2) evaluate the role of stakeholder opinions in monitoring elephant effects. Initial results show similar values between the three key stakeholder groups evaluated: local farmers, scientists and

conservation managers, suggesting that these values can be consolidated in order to determine the desired state of succulent thicket with elephant. These values were subsequently correlated with both ecological and remote-sensed measures that can be used for monitoring. This work represents a novel approach to identifying critical thresholds in complex socio-ecological systems.

Clayton Weatherall-Thomas (PhD student) is investigating the utilization thresholds for the maintenance of Thicket floral diversity. The majority of endemic species in the Thicket biome are dwarf succulents, of which many are found in Thicket. These species are threatened by overutilization by domestic game, but also by enclosed populations of megaherbivores such as elephants. This study aims to identify the effects of new and established populations of elephants on the dwarf succulents of Thicket. This should result in identifying the utilization threshold of Thicket based on dwarf succulents, a necessary management tool for the many game reserves in Thicket. The initial baseline vegetation assessment has been conducted in the Colchester-section of Addo Elephant National Park, which has recently been exposed to elephants. The succulent diversity of different areas that have undergone various levels of megaherbivore utilization is in the process of being sampled.

Janis Smith (MSc student) has completed her work on using remote-sensing to assess the temporal and spatial trends of elephant induced thicket degradation in the Addo Elephant National Park. She showed that (1) thicket condition deteriorated as the Park was expanded, (2) degraded vegetation expanded away from water, and (3) thicket condition in botanical reserves fluctuated over time. Her analysis, using landscape spatial matrices, revealed evidence of increased vegetation fragmentation as new areas were opened to elephant, while a progressive decline in intact thicket and increase in degraded thicket was observed. Considering the current elephant densities, she concluded that thicket degradation within the Addo Elephant National Park would continue.

RESOURCE ECOLOGY

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.

Interactions between biodiversity and ecotourism

Kristine Maciejewski completed the data collection for her PhD and submitted it for examination at the end of the year. She focused on a hierarchy of interactions, showing (1) that private reserves do not maximize the conservation opportunities in land acquisition but rather choose to select "big five" habitat, (2) that space use for game viewing within reserves is relatively limited, suggesting a tradeoff between needs for large areas for conservation and efficiency for game viewing (3) that ecotourists are selective in their game viewing preferences, typically focusing on the large charismatic species (4) that the presence of juveniles influences game viewing patterns, with more time spent watching when juveniles are present (5) that elephant viewing success is independent of elephant density, such that it is not necessary to maintain high densities of elephants. Her work obviously has considerable relevance to the ecotourism industry and to policy-makers.

Predator-livestock interactions

The proposal for "A Concept framework for a co-operative stock predation research programme in South Africa" must still be supported by industry stakeholders, and a further proposal on a scientific assessment of livestock predation research and management was requested by the National Department of Agriculture.

Livestock Guarding Dogs

Gail Potgieter (MSc student) has been measuring the effectiveness of livestock guarding dogs (LGDs) from the perspective of stock farmers and the conservation of predators, working in Namibia with the Cheetah Conservation Fund. She showed that stock farmers have a very high level of satisfaction with the LGDs, even in instances where there was no reported decline in loss of livestock to predators. More importantly, she showed that LGDs, which till now have been considered a non-lethal method of predator control, do in fact kill predators, particularly jackal and caracal. She submitted her MSc for examination at the end of the year.

Lion-human conflict in Botswana

Gosiame Neo-Mahupeleng's PhD study on lion and spotted hyaena conflict in the Chobe area of Botswana has been proceeding slowly as Gosiame has faced setbacks with tracking collar losses from the spotted hyaenas. He has completed an analysis of the seasonal and spatial variability of human wildlife conflict and this is correlated with wildlife density, particularly for lions and less so for spotted hyaenas and leopards. Lion attacks on cattle were also higher in the wet season, but there was no such clear seasonal pattern for the other predators.

ECOPHYSIOLOGY

This theme seeks to understand how physiological traits/characteristics constrain/aid the flow of energy from the environment into living organisms and how that energy is ultimately translated into an organism's fitness, especially those animals that cannot migrate when confronted with unpredictable inputs of energy in time and space.

Interpopulation physiological variation

Tanja van de Ven submitted her MSc for examination at the end of the year. She investigated seasonal changes in energy expenditure of two populations of southern red bishops. She showed that metabolic rates are highly plastic and that the magnitude and direction of change differs from population to population even within the same species. Her work calls into question the use of single, species-specific physiological variables in macrophysiology. Two manuscripts emanating from this work are currently in review.

Bat Physiology

Anna Doty (MSc) investigated the use of metabolic depression and daily torpor in four previously un-studied Eastern Cape bat species. She showed that contrary to many published studies, some bat species prefer using daily torpor in summer and maintain higher body temperatures during winter time. The study raises the possibility that competing processes during summer, for example, reproduction and immunity, may preclude the use of daily torpor. This possibility remains to be investigated. She submitted her MSc for examination at the end of the year.

Hierarchical patterns in heat production

Shaun Welman (MSc) is currently investigating seasonal changes in the heat production capacity of the four-striped mouse. The emphasis of his project is on establishing whether there are correlations in heat production parameters at different levels of physiological organization (subcellular, tissue and *in vivo*). We have managed to secure funding to enable Shaun to complete the tissue analyses of his samples in Germany during 2012.

Physiological costs of advertising

Stacey Leigh Hallam started up a PhD, and is investigating the physiological cost of the production of extravagant plumage in bird species of the genus *Euplectes*. Her fieldwork will start in July 2012.

Golden mole physiology

Kwezi Mziilikazi has been collaborating with Fabien Genin (University of Fort Hare) on the ecophysiology of the endangered giant golden mole, *Chrysoxplax trevelyani*. Virtually nothing is known of this species' biology and with most of its habitat currently under threat, studies on this species are pressing. She is also looking into studying the trade-offs between the use of heterothermy low body temperatures (sometimes as low as 1°C) and reproduction and immune-competence.

PREDATOR PREY INTERACTIONS

This theme seeks to understand the nature and consequences of predator prey interactions, to provide guidelines for the management of predators and their prey, as well as understanding the consequences of apex predator reintroductions on other components of the ecosystem

Apex predator impacts

Craig Tambling (NRF Post Doctoral Fellowship) continued monitoring the impact of reintroduced apex predators on components of ecosystems in the Frontier region (areas surrounding the SANParks Frontier cluster of reserves in the Eastern and Western Cape) of South Africa. This research includes ongoing monitoring of the buffalo population in the Main Camp and Colchester Sections of the Addo Elephant National Park (AENP) as well as an assessment of the current predation patterns of lions in both the Main Camp/Colchester complex and the Nyathi Section of the AENP.

Prey switching

Julia Wentworth (MSc Student) has completed her research on prey switching and resource partitioning of lion and hyaena in relation to changes in prey availability based on the long term dataset obtained from scats collected between 2003 and 2009 in the Main Camp Section of the AENP. She submitted her dissertation for examination at the end of the year.

Responses of mesopredators

The long term study investigating the response of jackal diet to the presence of apex predators has been ongoing and the field component of the project in all Frontier Parks has been completed. Rogan Fourie (Honours Student) has analysed components of the Karoo National Park jackal diet dataset investigating the impact of reintroducing springbok and lions on the diet estimates of jackal. The reintroduction of lions resulted in an increase in the consumption of large ungulates, a resource previously unavailable to the jackals in this ecosystem.

Landscape ecology of jackals

Liaan Minnie (PhD Student) has initiated sample collection of jackals on reserves and farms in order to assess if jackal are moving between protected landscapes and neighbouring farms.

Modelling predator diets

Hayley Clements (MSc Student) has collated various cheetah diet datasets from across South Africa and is in the process of refining existing cheetah carrying capacity models to incorporate age and sex data into these models. By incorporating fine scale cheetah kill data we may be able to increase predictive ability in terms of understanding how many large predators small-medium sized reserves can hold.

Impacts of cheetah on prey

Douglas Makin (MSc Student) is assessing the impacts of cheetah predation on ungulate species, by comparing two adjacent sections (one with and one without cheetah) of a private

reserve. During 2011 he spent time in the field recording vigilance rates, group sizes, browsing heights and population demographics of prey species to assess the impacts that predation have had on the behavioural responses and landscape use of the resident ungulate community.

The research conducted on predator prey interactions with special reference to large predator reintroductions has enabled ACE students (Craig Tambling, Rogan Fourie and Hayley Clements [awarded best Poster]) to present several aspects of this research at the South African Wildlife Management Association Annual Symposium. Craig Tambling once again presented the ongoing research conducted in Addo Elephant National Park to the honorary rangers at their April monthly meeting. Matt Hayward (Research Fellow) has continued publishing data collected during his tenure on the large carnivore reintroduction project conducted in the Addo Elephant National Park. The research resulted in six peer reviewed publications and one popular article published in 2011.

TRANSFORMATION AND RESTORATION ECOLOGY

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) is investigating the ease of vegetative propagation and drought stress physiology of eight woody canopy species and one succulent species, for use with the succulent, easily-propagated *Portulacaria afra* (Spekboom), in the rehabilitation of subtropical Thicket vegetation. She has shown that the reintroduction of propagated woody canopy shrubs and trees into degraded Thicket sites does not appear to be a practical or economical method of actively restoring biodiversity to rehabilitation sites. As woody climax species have been shown to return to sites planted with Spekboom truncheons through 'natural regeneration' within approximately 50 years, future research efforts should focus on optimising restoration site selection and planting techniques in order to maximize carbon sequestration potential of planted truncheons, which will, in the long term, result in an environment that can support regeneration of the biodiversity that resembles intact Thicket. Merika submitted her MSc for examination at the end of the year.

Factors influencing ecological thresholds in Mosaic Thicket

Anton Schmidt (PhD student) is testing the hypothesis that thicket transformation will follow a state-and-transition model, in which the system will initially be resilient until some threshold is crossed, whereafter there will be a rapid shift to a new state. His approach is to look for changes in plant species richness, plant functional types and vegetation structure across transformation gradients (piospheres), and to correlate these changes to changes in ecosystem processes, resilience and biogeochemical functioning. The results from the study will be used to develop a transformation model for the region which land-users can use to gauge the degree of transformation of their land and to warn them against imminent irreversible changes to the ecosystem. Currently all field data have been collected and an initial analysis of structural changes along the transformation gradients has taken place.

Soil erosion and sediment source dynamics

Munyaradzi Manjoro (PhD student) has been using remote sensing and isotope and mineral magnetic fingerprinting to identify the source of sediments released under erosion in Ngqushwa District of the Eastern Cape. He has shown that much of this sediment has been released from areas of grassland and that prior to 1965 this was mostly surface sediment, but after that subsurface sediment input increased. This study substantially enhances our understanding of soil erosion and sediment sources. Munyaradzi submitted his thesis for examination at the end of the year.

Early Iron Age Settlements

Jim Feely (Research Associate) reanalysed a dataset on the distribution of early Iron Age Settlements in the eastern sector of the Eastern Cape (the old Transkei), and showed that these sites were typically in the deeply incised valleys. His work suggests an early initiation of vegetation transformation and argues for the need to recognise these effects in conservation management.

Warthog as an invasive species

Gideon Rossouw has extended the previous studies done in ACE on warthog as an invasive species to focus on the reproductive capacity of warthog to explain why they are so successful. This is based on the observation that warthog are not particularly unusual in their resource use, but do produce relatively large litters. Gideon is collecting reproductive and growth material from warthog in Addo to quantify their reproductive ability.

BIODIVERSITY

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

Historical distribution of the larger mammals in the Western & Northern Cape

This project, led by André Boshoff, involved the revision and publication (as a Second Edition) of the book by the late CJ "Jack" Skead dealing with what is now the Western and Northern Cape provinces. The title of the revised book is:

Skead, C.J. 2011. Historical incidence of the larger land mammals in the Western and Northern Cape. Second Edition (eds: Boshoff AF, Kerley GIH & Lloyd PH). Port Elizabeth: Centre for African Conservation Ecology, Nelson Mandela Metropolitan University. 519 pp.

An initial run of 1 000 copies came off the printing press in March 2011, and copies of the book were distributed to qualifying recipients, notably relevant national and provincial research and educational institutions, national and provincial governmental departments, and planners and managers of national, provincial and local protected areas (parks and nature reserves) within the area covered by the book. Copies of the book were made available for purchase by the general public, and is proving of value to scholars, environmental historians, owners and managers of private game/nature reserves, game farmers and environmental impact practitioners. The funds from the sale of the book are ring-fenced for updating and reprinting the book in the future.

The historical incidence of the larger mammals of the Free State Province and Lesotho

This project involves the writing of a book, by André Boshoff and Graham Kerley, that investigates and describes the historical incidence of the larger mammals of the Free State Province and Lesotho. The overall aim of the project is to extend eastwards and north-eastwards the geographical coverage, on the same topic, of the revised editions of the two books written by CJ Skead (Skead 2007, 2011), which form a model for this book. However, this project involves the preparation of a First Edition, as no prior material exists. From May to December 2011, the work focused on developing an appropriate structure (i.e. outline of content) for the book, followed research aimed at locating relevant extracts from the published and unpublished literature that deals with the topic at hand. The literature search was mainly confined to the archaeological field, early written records and recent (post-1960) records. Data, information and suitable illustrations (e.g. old photographs, prints, painting, etchings) were sought for some 45 species of larger mammal. The draft of an introductory chapter was prepared.

SCIENCE MANAGEMENT

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

- André Boshoff served as a member of BirdLife South Africa's Conservation Committee.
- 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.
- Staff and students reviewed proposals for the National Geographic Society, Austrian Science, EarthWatch, 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*, *Ecography*, *Ecology Letters*, *Journal of Arid Environments*, *Journal of Mammalogy*, *Mammalian Biology*, *PLOSOne*, *South African Journal of Wildlife Research*.

COMMUNITY SERVICE

- Graham Kerley serves as a member of the Board of Directors of South African National Parks.
- Staff and students provided valuable opportunities for participants in the volunteer programmes in Addo Elephant National Park and Samara Private Game Reserve to learn about the various research programmes.
- Graham Kerley was invited to serve on the Scientific Advisory Committee of the Predator Management Forum, and Shirley Parker-Nance provided secretarial support to this committee.
- Staff and students provided educational talks to a variety of school groups.
- Liaan Minnie has provided numerous talks to livestock farmers on the issue of predator conservation.
- ACE continued to operate the Grysbok Environmental Education Trail, with nearly 1000 school-level learners participating in the trail experience in 2011.
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EXTERNAL ACADEMIC SERVICE

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:

- STEERS, K. Competitive behavior in goats. MSc thesis, University of Kwazulu-Natal, with co-supervision by Graham Kerley.
- MKETENI, F. Small elephant populations in South Africa: identification and characterization of populations. MSc thesis, University of the Free State, supervised by Graham Kerley.

ACE Members served as External Examiners to Rhodes University, University of Fort Hare, University of Kwazulu Natal, University of Malawi, and the University of the Witwatersrand.

2011 Products

Refereed Scientific Publications

1. BOSHOFF, A. & MINNIE, J. 2011. 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* 61:4-15.
2. BRIGHAM, R. M., WILLIS, C.K.R., GEISER, F. & MZILIKAZI, N. 2011. Baby in the bathwater: Should we abandon the use of body temperature thresholds to quantify expression of torpor? *Journal of Thermal Biology* 36: 376 – 379.
3. BOSHOFF, A.F., MINNIE, J.C., TAMBLING, C.J. & MICHAEL, M. 2011. The impact of power line-related mortality on the Cape Vulture *Gyps coprotheres* in a part of its range, with an emphasis on electrocution. *Bird Conservation International*. 21: 311-327.
4. FEELY, J.M. & BELL-CROSS, S.M. 2011. The Distribution of Early Iron Age Settlement in the Eastern Cape: Some Historical and Ecological Implications. *South African Archaeological Bulletin*. 66(194):105-112.
5. GEISER F & MZILIKAZI N. 2011. Does torpor of elephant shrews differ from that of other heterothermic mammals? *Journal of Mammalogy* 92: 444 - 451
6. HALLAM, S.L. & MZILIKAZI, N. 2011. Heterothermy in the southern African hedgehog, *Atelerix frontalis*. *Journal of Comparative Physiology B* 181: 437 – 445.
7. HAYWARD, M.W., HAYWARD, G.J., TAMBLING, C.J., & KERLEY, G.I.H. 2011. Do lions *Panthera leo* activity select prey or do prey preferences simply reflect chance responses via evolutionary adaptations to optimal foraging? *PlosOne* September 20116(9)1-6.
8. HAYWARD, M.W. 2011. Scarcity in the prey community yields anti-predator benefits. *Acta Oecologia* 37: 314-320.
9. HAYWARD, M.W. 2011. Using the IUCN Red List to determine effective conservation strategies. *Biodiversity and Conservation* 20: 2563-2573.
10. HETEM, R.S., DE WITT, B.A., FICK, L.G., FULLER, A., MALONEY, S.K., MEYER, L.C., MITCHELL, D. & KERLEY, G.I.H. 2011. Effects of desertification on the body temperature, activity and water turnover of Angora goats. *J. Arid Envir.* 75(1):20-28.
11. HORAK, I.G., WELMAN, S., HALLAM, S.L., LUTERMANN, H & MZILIKAZI, N. 2011. Tick infestation of four-toed elephant shrews, *Petrodromus tetradactylus* and southern African hedgehogs, *Atelerix frontalis*. *Onderstepoort Journal of Veterinary Research* 78: Art 243. doi: 10.4102/ojvr.v78i1.243
12. KERLEY, G.I.H, KOWALCZYK, R. & CROMSIGT, J.P.G.M. 2011. Conservation implications of the refugee species concept and the European bison: king of the forest or refugee in a marginal habitat. *Ecography* 34: 001-0011. doi: 10.1111/j.1600-0587. Early View.
13. KNIGHT, A. T., COWLING, R. M., BOSHOFF, A. F., WILSON, S. L. & PIERCE, S. M. 2011. Walking in STEP: Lessons for linking spatial prioritization to implementation strategies. *Biological Conservation*. 144: 202-211 [doi:10.1016/j.biocon.2010.08.017](https://doi.org/10.1016/j.biocon.2010.08.017)
14. LINDSEY, P., ROMAÑACH, S., TAMBLING, C. & CHARTIER, K. (2011) Ecological and financial impacts of illegal bushmeat trade in Zimbabwe. *Oryx* 45 (1): 96-111.
15. LINDSEY, P., TAMBLING, C.J., BRUMMER, R., DAVIES-MOSTERT, H., HAYWARD, M., MARNEWICK, K. & PARKER, D. (2011) Minimum prey and area requirements of the Vulnerable cheetah *Acinonyx jubatus*: implications for reintroduction and management of the species in South Africa. *Oryx* 45: 587-599. doi:10.1017/S003060531000150X.
16. LINKLATER, W., ADCOCK, K., DU PREEZ, P., SWAISGOOD, R., LAW, P. KNIGHT, M.H., GEDIR, J. & KERLEY, G.I.H. 2011. Simplified guidelines for large herbivore translocation: black rhinoceros case study. *J. Appl. Ecol.* 48:493-502. doi: 10.1111/j.1365-2664.2011.01960.x
17. LINKLATER, W. L. & GEDIR, J. V. 2011 Distress unites animal conservation and welfare towards synthesis and collaboration. *Animal Conservation* 14 (1): 25-27.
18. MARTINS, Q., HORSNELL, W.G.C., TITUS, W., RAUTENBACH, T. & HARRIS, S. (2011) Diet determination of the Cape Mountain leopard using global positioning system location clusters and scat analysis. *Journal of Zoology*. 283 (2):81-87.
19. MCKECHNIE, A.E & MZILIKAZI N, 2011. Heterothermy in Afrotropical mammals and birds: a review. *Integrative and Comparative Biology* 51: 349 – 363
20. MHANGARA, P., KAKEMBO, V. & KYOUNG J. 2011. Soil Erosion Risk Assessment of the Keiskamma Catchment, South Africa using GIS and Remote Sensing, *Environmental Earth Sciences*, DOI 10.1007/s12665-011-1190-x.
21. MUGAGGA, F., KAKEMBO V & BUYINZA, M. 2011. Land use Changes on the Slopes of Mount Elgon and the Implications for the Occurrence of landslides, *Catena*, doi:10.1016/j.catena.2011.11.004.

22. ODINDI, J.O & KAKEMBO, V. 2011. The hydrological response of *Pteronia incana* invaded areas in the Eastern Cape Province, South Africa. *Ecohydrology*. 4(6):832-840.
23. SIMELANE, T. 2011. Are Traditionally Used Resources within Conservation Areas a Function of Their Size? *Natural Resources*. 2: 130-139.
24. WENTWORTH, J.C., TAMBLING, C. J., & KERLEY, G.I.H. 2011. Evidence for prey selection by spotted hyaena in the Eastern Cape, South Africa. *Acta Theriologica* 56(4):389-392.

Book Chapters or Contributions to Books

1. SIMELANE, T. 2011. Implications of Wood Collecting Activities on Invertebrates Diversity of Conservation Areas In. SOFO, A. (ed.) *Biodiversity*. Chapter 3. pp. 14.

Books

1. SKEAD, C.J. 2011. *Historical incidence of the larger land mammals in the broader Western and Northern Cape*, Second Edition. BOSHOFF, A.F., KERLEY, G.I.H. & LLOYD, P.H. (eds.). Centre for African Conservation Ecology, Nelson Mandela Metropolitan University, Port Elizabeth.

Reports

1. MUIR, A., SKOWNO, A. & KERLEY, G.I.H. 2011. Combining conservation and socio-economic development: An assessment of eco-tourism-based private game reserves in the Eastern Cape. *Centre for African Conservation Ecology Report* 60: 1-34.

Popular Articles

1. KERLEY, G.I.H. 2011. Steytlerville giants. *Magnum* October: 20-21.
2. TAMBLING, C.J., HAYWARD, M.H. & KERLEY, G.I.H. 2011. Buffalo of the Addo Elephant National Park: a rollercoaster ride of vulnerability to lion predation. *Environment* 6:16-17.

Conference Presentations

1. BOSHOFF, A.F, MINNIE, J.C & MICHAEL M.D. Electrocution of Cape Griffons *Gyps coprotheres* on power line infrastructure: a pragmatic approach to identifying and prioritising areas for conservation action. Wildlife and Energy Symposium, Howick, KwaZulu-Natal, March 2011,
2. CAMPBELL, E.E. Ten years of Bontveld Rehabilitation – Where are we? Invited Speaker, Thicket Forum, Grahamstown: 2-3 November 2011.
3. CLEMENTS, H., KERLEY, G.I.H. & TAMBLING, C.J. 2011. Evolving African predator-prey models: from species-level diet analysis and carrying capacity models to incorporating prey demographics and predator social structure. Poster presentation. SAWMA Symposium: Hartenbos Holiday Resort, Southern Cape: 18-21 September 2011. **Best Student Poster Award**.
4. FOURIE, R., TAMBLING, C.J., GAYLARD, A. & KERLEY, G.I.H. 2011. Does reintroduction of apex predators influence jackal diet? Oral presentation. SAWMA Symposium: Hartenbos Holiday Resort, Southern Cape: 18-21 September 2011.
5. GROBLER, B.A, CAMPBELL, E.E. & DU PREEZ, D.R. Plant species of conservation concern in the Baakens River Valley, Port Elizabeth. Oral presentation. Custodians of Rare and Endangered Wildflowers Annual Workshop. Betty's Bay: 1-3 April 2011.
6. GROBLER, B.A., CAMPBELL, E.E. & DU PREEZ, D.R. A systematic conservation assessment and plan for the Baakens River Valley, Port Elizabeth. Oral presentation. Thicket Forum. Grahamstown: 2-3 November 2011.
7. HALLAM, S. L. Hibernation in the southern African hedgehog. Joint ZSSA PARSAs conference, 10 – 13 July, Stellenbosch, South Africa.
8. KAKEMBO, V & MUGAGGA F. Clay Content and the Implications for Landslide Occurrence on the Slopes of Mount Elgon, eastern Uganda. Oral paper presented at the 1st International Conference on clays and clay minerals in Africa and 2nd International Conference on Geophagia in southern Africa, Bloemfontein, 19 – 21 October, 2011.
9. KAKEMBO, V & MUGAGGA F. On the implications of soil physical properties for landslide occurrence on the slopes of mount Elgon, eastern Uganda"; Oral presentation at the International conference on East African Mountains: Reconciling resource demands, climate change and conservation, Mbale, Uganda, 14 – 16 November, 2011.
10. KERLEY, G.I.H. Sustainable hunting and management of African ungulates. Invited Oral presentation. Symposium: Monitoring of game populations and sustainable hunting. Supraślą, 14 June, Poland.

11. KERLEY, G.I.H., KOWALCZYK, R. & CROMSIGT, J.P.G.M. The Refugee Species Concept: getting conservation wrong, spatially. Invited Oral presentation. Zoological Society of Southern Africa Annual Symposium, Stellenbosch, 10-13 July.
12. KOWALCZYK R., KERLEY G.I.H, CROMSIGT J.P.G.M. Refugee species conservation – the European bison as an example. VIth European Congress of Mammalogy, Université P. et M. Curie - Muséum National d'Histoire Naturelle, Paris, France, 19-23 July.
13. LANDMAN, M., KERLEY, G.I.H. & SCHOEMAN, D.S. Co-Existing African mega-browsers: using a shift in diet as evidence for interspecific competition. Oral presentation. Zoological Society of Southern Africa Annual Symposium, Stellenbosch, 10-13 July.
14. MACIEJEWSKI, K. & KERLEY G. I. H. The Value of Stocking Extralimital Species for ecotourism. Presented at the International Convention of Conservation Biology, Society of Conservation Biology. Auckland, New Zealand.
15. MACIEJEWSKI, K. & KERLEY, G.I.H. 2011. What is the value to the stocking of extralimital species to ecotourism? Oral presentation. SAWMA Symposium: Hartenbos Holiday Resort, Southern Cape: 18-21 September 2011.
16. MEYER-MILNE, E. & CAMPBELL, E.E. Investigating Calcrete Bontveld landscape ecology for biodiversity conservation and resource management. Oral Presentation. Thicket Forum. Grahamstown: 2-3 November 2011.
17. MINNIE, L., BOSHOFF, A. & KERLEY, G.I.H. 2011. Habitat-specific livestock predation by leopards *Panthera pardus* in the Baviaanskloof, South Africa: Implications for biodiversity conservation. Oral presentation. SAWMA Symposium: Hartenbos Holiday Resort, Southern Cape: 18-21 September 2011.
18. MOOLMAN, L. & KERLEY, G.I.H. 2011. The Knysna elephants as candidates for the refugee species concept. Poster presentation. SAWMA Symposium: Hartenbos Holiday Resort, Southern Cape: 18-21 September 2011.
19. MUGAGGA, F & KAKEMBO V. On the implications of land use change and topographic attributes for landslide occurrence on the slopes of Mount Elgon, eastern Uganda. Oral presentation at the International conference on East African Mountains: Reconciling resource demands, climate change and conservation, Mbale, Uganda, 14 – 16 November, 2011.
20. MUNISHI, L., KERLEY, G.I.H. & FOLEY, C. 2011. Genetic relatedness reflects competitive and conflict behaviour in female African elephants. Oral presentation. SAWMA Symposium: Hartenbos Holiday Resort, Southern Cape: 18-21 September 2011.
21. MUNISHI, L.K., KERLEY, G.I.H., WASSER, S.K., LANDMAN, M. & FOLEY, C. A. H. Differences in the expression of group formation size and relatedness in African elephant populations. Oral presentation. Zoological Society of Southern Africa Annual Symposium, Stellenbosch, 10-13 July.
22. MZILIKAZI, N. Heterothermy in the Afrotropics. Joint ZSSA PARSAs conference, 10 – 13 July, Stellenbosch, South Africa.
23. POTGIETER, G., MARKER, L., AVENANT, N. & KERLEY, G.I.H. 2011. The effectiveness of livestock guarding dogs for livestock production and conservation in Namibia. Oral presentation. SAWMA Symposium: Hartenbos Holiday Resort, Southern Cape: 18-21 September 2011.
24. ROSSOUW, G.J., KERLEY, G.I.H. & LANDMAN, M. Unravelling the drivers of invasiveness in a large mammal: warthog as a case study. Poster presentation. Zoological Society of Southern Africa Annual Symposium, Stellenbosch, 10-13 July.
25. TAMBLING, C.J., MEYER, J., MINNIE, L., SANTYMIRE, R., FREEMAN, E. & KERLEY, G.I.H. 2011. Fear of the dark: Does reintroducing apex predators affect the timing of movement of co-occurring species? Oral presentation. SAWMA Symposium: Hartenbos Holiday Resort, Southern Cape: 18-21 September 2011.
26. THOLE, N. - Seasonal variation in energy expenditure of the woodland thicket rat (*Grammomys dolichurus*). Joint ZSSA PARSAs conference, 10 – 13 July, Stellenbosch, South Africa.
27. Van de Ven. Phenotypic plasticity of metabolic rate in the southern red bishop across a temperature gradient. Joint ZSSA PARSAs conference, 10 – 13 July, Stellenbosch, South Africa.
28. WEATHERALL-THOMAS, C.R. & CAMPBELL, E.E. Baseline vegetation assessment of the Greater Addo Elephant National Park. Oral Presentation. Thicket Forum. Grahamstown: 2-3 November 2011.

Post- Graduate Training Honours Projects

1. FOURIE, R.M. 2011. The effect of management perturbations on the diet of the black-backed Jackal (*Canis mesomelas*) in the Karoo National Park. BSc(Hons) Project, Nelson Mandela Metropolitan University.

2. SMITH, D. 2011. Overcoming sampling bias for three endoparasitic helminth egg types in the black rhinoceros (*Diceros bicornis minor*) in the Great Fish River Nature Reserve, South Africa. BSc(Hons) Project, Nelson Mandela Metropolitan University.

Postgraduate degrees completed – M.Sc

1. DE KOCK, R. 2011. Bushclump rehabilitation of Grassveld Bontveld after strip mining. MSc dissertation, Nelson Mandela Metropolitan University.

Postgraduate degrees completed – Ph.D

1. MHANGARA, P. 2011. 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.
2. MUGAGGA, F. 2011. Land use change, landslide occurrence and livelihood strategies on Mount Elgon slopes, Eastern Uganda. Unpublished PhD thesis, Nelson Mandela Metropolitan University.
3. NKONGOLO, N.V. 2011. Quantification of greenhouse gas fluxes from soil in agricultural fields. Unpublished PhD thesis, Nelson Mandela Metropolitan University.

Postgraduate degrees in progress – M.Sc

1. CLEMENTS, H. Impacts of reintroduced cheetah. MSc thesis, Nelson Mandela Metropolitan University.
2. BARBARDO, N. Sustainable harvesting of *Cyclopia intermedia* in the Kouga district, Eastern Cape, South Africa. MSc thesis, Nelson Mandela Metropolitan University.
3. DOTY, A. Aspects of heterothermy in four species of Afrotropical bats. MSc dissertation, Nelson Mandela Metropolitan University.
4. ELLIS, K. Revision of Aloe Section Prologatae Series Macrifoliae. MSc thesis, Nelson Mandela Metropolitan University.
5. FINCA, A. Modelling Trends of Evapotranspiration using MODIS LAI in the catchments of the Eastern Cape.
6. GROBLER, B. A Systematic conservation assessment and plan for the Baakens River Vallay, Port Elizabeth. MSc thesis, Nelson Mandela Metropolitan University.
7. 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.
8. LOUW, M. The propagation and ecophysiology of thicket species: in contribution to rehabilitation of Eastern Cape thickets. MSc dissertation, Nelson Mandela Metropolitan University.
9. NDOU, N. Linking vegetation condition to grazing management systems in the Keiskamma catchment, Eastern Cape Province: A GIS and Remote Sensing approach.
10. MAKIN, D.F. Patch use response of prey species to reintroduced predators. MSc thesis, Nelson Mandela Metropolitan University.
11. POTGIETER, G.C. Effectiveness of livestock guarding dogs. MSc thesis, Nelson Mandela Metropolitan University.
12. SINGH, K. Population dynamics of the Zuurberg cycad and the predicted impact of climate change. MSc thesis, Nelson Mandela Metropolitan University.
13. SMITH, J. Using remote-sensing to assess elephant-induced vegetation change in the Addo Elephant National Park. MSc dissertation, Nelson Mandela Metropolitan University.
14. VAN DE VEN, T. Phenotypic plasticity of metabolic rate in an Afrotropical bird species. MSc dissertation, Nelson Mandela Metropolitan University.
15. WENTWORTH, J. Diet shifts and overlaps of lion and spotted hyaena in the Addo Elephant National Park. MSc thesis, Nelson Mandela Metropolitan University.
16. WELMAN, S. Seasonal heat production in *Rhabdomys pumilio*. MSc thesis, 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. HALLAM, S.L. The physiological cost of extravagant plumage in birds of the genus *Euplectes*. PhD thesis, Nelson Mandela Metropolitan University.
3. LANDMAN, M. Megaherbivores in succulent thicket: resource use and implications. PhD. thesis, Nelson Mandela Metropolitan University.

4. MACIEJEWSKI, A. Exploring the linkages between biodiversity and ecotourism in protected areas. PhD thesis, Nelson Mandela Metropolitan University.
5. DE RIDDER, K. The effects of Acacia karroo tree density on grass species. PhD thesis, Nelson Mandela Metropolitan University.
6. 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.
7. 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.
8. MILNE, E. Bontveld Ecosystem Conservation: Proposing land use practices that will maintain rarity and spatial patterns on unaltered geomorphologic profiles. PhD thesis, Nelson Mandela Metropolitan University.
9. MINNIE, L.M. Metapopulation dynamics of black backed jackal on and off reserves in the Eastern Cape, South Africa. PhD thesis, Nelson Mandela Metropolitan University.
10. MOOLMAN, L. The Knysna elephants as a refugee species. PhD thesis, Nelson Mandela Metropolitan University.
11. MUNISHI, L. Elephant social interactions, Tarangire National Park, Tanzania. PhD thesis, Nelson Mandela Metropolitan University.
12. NEO-MAHUPELENG, G. Lion human interactions in the Chobe District Botswana. PhD thesis, Nelson Mandela Metropolitan University.
13. 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.
14. SCHMIDT, A.G. Factors affecting ecological thresholds in Mosaic Thicket. PhD thesis, Nelson Mandela Metropolitan University.
15. WEATHERALL-THOMAS, C.R. Utilization thresholds for the maintenance of thicket floral diversity. PhD thesis, Nelson Mandela Metropolitan University.
16. 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.

Postdoctoral Research In Progress

1. Dr Halszka Hrabar. 2009 - . Conservation biology and behavioural ecology of Cape Mountain Zebra.
2. Dr Craig Tambling. 2010 - . Interactions between predators in the Eastern Cape.

Financial Statements

The 2011 Financial statements are presented as two separate statements,
 - One representing the Operational Funds for running ACE (this page),
 - One representing the research funds for projects undertaken under the auspices of ACE.

This format serves to highlight the efficient manner in which funds are focused on the core business (research) of the Centre, and operation expenses are minimized.

INCOME STATEMENT ACE Operational Funds

ENTITY NAME: *	ACE
ENTITY LEADER: *	Prof G Kerley
FACULTY:*	Science
COST CENTRE(S): *	4850, BC64, N087,N096
INCOME STATEMENT FOR PERIOD :	31 December 2011
Opening Balances	81021.26
INCOME	153011.81
Funds Research	152450
Interest Received	561.81
EXPENDITURE	150859.14
Salaries	61000
Operating Expenses	82999.14
Teach Equip	6860
Closing Balance	<u>83173.93</u>

Signed off by Entity leader

Name :

Signature:*

Comment by Entity leader:*

Signed off by Finance Dept.

Name :

Rheinard van Onselen
 Accountant Research and Third Stream Income
 23 April 2012

Signature :



INCOME STATEMENT ACE Research Funding

ENTITY NAME: * ACE
 ENTITY LEADER: * Prof G Kerley
 FACULTY: * Science
 COST CENTRE(S): * N217,N311,N322,G152,G478,G508,G534,G536
 G537,G541,L153,L273,N084,N088,N089,N091
 N092,N093,N094,N097,N098,N219,N250,N254
 N255,N265,N301,G387,L196,L259,L266,L286
 N292,N306,G231,N310,L238

INCOME STATEMENT FOR PERIOD : 31 December 2011

Opening Balances	2,344,821.00
INCOME	1,375,511.77
Council Funds	501,180.00
Private Grants Unrestricted	99,409.10
Grant Funding	604,838.98
Funds Research	95,542.99
Interest Received	74,540.70
EXPENDITURE	1,970,106.21
Salaries	382,561.72
Operating Expenses	1,277,418.53
Equipment	95,124.76
Bursaries	200,000.00
Travel And Subsistence	15,001.20
Closing Balance	1,750,226.56

Signed off by Entity leader

Name :

Signature:*

Comment by Entity leader:*

Signed off by Finance Dept.

Name :

Rheinard van Onselen
 Accountant Research and Third Stream Income
 23 April 2012

Signature :



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.

ADVISORY BOARD, STAFF AND ASSOCIATED STUDENTS

Advisory Board 2011

Prof. Andrew Leitch (Chair)	Dean Faculty of Science, NMMU (Chair)
Mr. Wayman Kritzinger	AGRI EC
Mr. Frank Mazibuko	National Research Foundation
Prof. James Gambiza	Department of Environmental Sciences - Rhodes University
Mr. Joram Mkosana	Nelson Mandela Bay Municipality – Environmental Management
Mr. Leon Els	Department of Economic Development & Environmental Affairs, Eastern Cape
Dr Luthando Dziba	Agricultural Research Council
Mr Andrew Muir	Wilderness Foundation
Mr Russel Smart	South African National Parks
Ms Bev Geach	Eastern Cape Parks & Tourism Agency
Dr William Fowlds	Indalo: Eastern Cape Association of Private Reserves

Staff

Prof. G. I. H. Kerley, (Director)	Dr. G. J. Rossouw
Prof. E. E. Campbell (Deputy Director)	Dr. S. Parker-Nance
Prof. V. Kakembo	Dr. S. R. Henley
Dr. D. du Preez	Dr. S. L. Wilson
Dr. A. F. Boshoff	Ms. M. Collett
Dr. N. Mzilikazi	

Research Associates

Dr. W. Linklater (NZ)	Dr. A. R. Palmer (SA)
Dr. M.W. Hayward (Aus)	Dr. M. H. Knight (SA)
Dr.S. Holness (SA)	Mr. J. Feely (SA)

Postdoctoral Researchers

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

MSc		PhD	
Ms. J. Smith	Geosciences	Ms. K. Gough	Zoology
Ms. M. Louw	Botany	Ms. M. Landman	Zoology
Ms. J. Wentworth	Zoology	M.s K. Maciejewski	Zoology
Ms. T. van der Ven	Zoology	Mr. P. Mhangara	Geosciences
Mr. A. Grobler	Botany	Mr. M. Manjoro	Geosciences
Ms. G. Potgieter	Zoology	Mr. L. Munishi	Zoology
Ms. A. Doty	Zoology	Mr. G. Neo-Mahupeleng	Zoology
Mr. S. Welman	Zoology	Mr. A. Nyamugama	Geosciences
Ms. H. Clements	Zoology	Mr. A. Schmidt	Zoology
Mr. D. Makin	Zoology	Mr. C. Weatherall-Thomas	Botany
Ms. N Barbado	Botany	Ms. R. Zengeni	Geosciences
Ms K Ellis	Botany	Mr. N. De Ridder	Botany
Ms A. Finca	Geosciences	Ms. B. Meyer-Milne	Botany
Mr. P Haindongo	Geosciences	Ms. L. Moolman	Zoology
Ms. N Ndou	Geosciences	Mr. L. Minnie	Zoology
Ms K Singh	Botany	Ms. S. Hallam	Zoology