

**2009-
2010**

**Department of
Environmental Science
Annual Report**



RHODES UNIVERSITY
Where leaders learn

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INTRODUCTION

This annual review reports and reflects on the achievements of the Department of Environmental Science over the period of 2009 and 2010. Our vision (Box 1) is central to guiding what we do and how we do it. Under the leadership of the former Head of Department, Charlie Shackleton, we revisited and revised our vision as a means of making sure that we build our identity in a way that is consistent with our vision. Having formulated the vision together, with only a slight change in emphasis from the previous vision, staff have committed themselves to work towards its realisation. The goals are a set of measurable outputs against which we are able to assess our achievements, and the purpose of this report is to highlight notable events and reflect on how we measure up to our vision and goals.

Box 1: Vision for the Department of Environmental Science

TO GENERATE AND DEVELOP KNOWLEDGE, SKILLS AND UNDERSTANDING OF COMPLEX, COUPLED HUMAN ENVIRONMENTAL SYSTEMS IN A GLOBALISING AND CHANGING WORLD THROUGH EXCELLENCE IN LEARNING, RESEARCH, COMMUNITY ENGAGEMENT AND PRACTISE.

The goals associated with this vision are to:

- Produce graduates capable of addressing complex environmental challenges, particularly in an African context
- Conduct relevant research at multiple interfaces between economic, social and biophysical systems
- Communicate research results for maximum impact at multiple scales from policy development to community action
- Collaborate with stakeholders, practitioners and communities to promote uptake of environmental best practice
- Achieve recognition as leaders in the environmental science discipline
- Advance environmental science as an academic discipline through knowledge development

The departure of Charlie Shackleton on sabbatical leave in June 2009 was co-incident with his decision to hand over the reins as Head of Department to someone else. This was important in many respects. It meant that Charlie could place greater emphasis on his own research and focus more on postgraduate training. A senior staff member with quite a lengthy institutional involvement and memory at Rhodes University passed on the reins to a more junior staff member,

Fred Ellery. Fred arrived at Rhodes about a year earlier, with very little institutional knowledge and with somewhat different disciplinary interests from those who had been in the Department for longer. Importantly, the Department was in a remarkably healthy state when Charlie left, testimony to his innovation and strong leadership. The thought uppermost in the mind of the new head was to keep the Department going along its previously very successful path. Fred has thus embraced the shared vision of his predecessor and staff, in recognition of outstanding achievements in their fields over the preceding decade, and, in keeping with the jingle that brands one of the world's best known vehicle brands "Everything keeps going right", decided to keep the formula in place and strengthen it as appropriate. Fred's broad interest in multidisciplinary collaboration will hopefully strengthen collegiality amongst staff and students within the department and also between different departments at Rhodes in ways that are mutually beneficial.

Although the department is small, a key aspect of our success is that we have outstanding people in place (Box 2) who share a common understanding of excellence in teaching, research and community engagement.

Box 2: Current staff of the Department

Kathy Cassidy – Senior Technical Officer
Fred Ellery – Associate Professor and Head of Department
James Gambiza – Senior Lecturer
Zelda Odendaal – Administrative Assistant
Charlie Shackleton – Professor
Sheona Shackleton – Senior Lecturer

STAFF SKETCH DURING THE PERIOD

Sheona Shackleton is in the curious position of having been associated professionally with the Department for a long time, but of being its most recently appointed employee. Despite only joining the Department in 2008, Sheona has demonstrated a remarkable capacity to deliver on every front. She has attracted substantial funding together with partners in southern Africa and North America, in a project that aims to examine the impact of climate change on HIV/AIDS and natural resource management, with an emphasis on limiting human vulnerability and fostering adaptation to climate change in southern Africa.

Charlie Shackleton went on sabbatical leave from July 2009 to June 2010, during which time he tells us he was at Rhodes for the first six months

“consolidating many projects that had been ongoing and needed to be completed”. This included writing several papers, as well as working on three books, one as lead author and two as co-editor. Along the corridor his door was heard to open and shut, and the distinctive sound of his slippers was heard passing through the tea room, but no one actually caught sight of him over this period. Charlie went to Bangalore in India for the second six months to launch new work with Indian partners on environmental issues there. He was hosted by the Department of Crop Physiology at Bangalore Agricultural University, and ATREE (Ashoka Trust for Research in Ecology and Environment) and found it difficult not to thoroughly enjoy the subcontinent. During the later half of 2010 he was elected as a fellow of the Academy of Science of South Africa in recognition of his contributions to science in the country.



Zelda Odendaal is our administrator having been appointed on a full-time basis early in 2009. Zelda effectively “runs” the Department through her ability to manage complex budgets, hold together the front office, keep track of student inquiries and keep staff on their toes. We are envied by all other Departments who hear of her remarkable administrative skills. Zelda has made the very sensible choice to live in Bathurst after many years in a very senior position in a world-leading hospitality chain, so she comes to Environmental Science with a wealth of talent, administrative knowledge and experience. She has a warm and outgoing disposition and plays a vital role in making this a successful department.

James Gambiza continues to excel as teacher, administrator, Hall Warden and scholar. In 2009 he was awarded a Masters Degree in Higher Education through the Centre for Higher Education, Research, Teaching and Learning (CHERTL) following the successful completion of a research thesis entitled “The relationship between learning styles and perceptions of blended learning: A case study of third-year Environmental Science

students at Rhodes University”. James was nominated by students in 2010 for the Vice-Chancellor’s Senior Teaching Award, and just before going to press was notified that he had received this distinguished award in recognition of excellence in teaching. As a department we are very proud of this remarkable achievement and congratulate James on this singularly distinguished achievement.

Fred Ellery was recently awarded lifelong membership of the International Mire Conservation Group (IMCG) in recognition of his achievements in teaching and research in the field of wetland science and management in southern Africa. The Wetland Management Series was published in 2009 following four years of research. The series was edited by Fred together with a number of collaborators and will appeal to wetland scientists and managers, and contribute to improved wetland rehabilitation practices in the country.

In addition to her normal load, Kathy Cassidy completed an Honours degree in Environmental Science in 2009. Her employment circumstances changed when she was appointed to a full-time position, which is testimony to the recognition she deserves for playing an increasingly important role in the department. We are delighted to have Kathy in a full-time post as she continues to be a pillar of support in respect of technical matters and co-ordinating many research and student related activities such as field trips and practicals. She also manages our website that is continuously kept current, and she helps collate research outputs, reports and plays a pivotal role in the production of our newsletter that is widely circulated. Given the interest generated through her research project at Honours level, she is talking about continuing with academic studies some time soon.



Research Associates and Fellows continue to add value to what we are able to achieve in the Department. Despite his appointment at Stellenbosch University, Andrew Knight continues his association with the Department as a Research Associate, while Maura Andrew who formerly

worked for a leading environmental consulting firm based in Grahamstown, Coastal and Environmental Services, joined us as a Research Associate in 2009. Dr Anthony Palmer also joined the Department as a Research Associate in 2010, largely for playing an integral role in the supervision of a postgraduate student. Mike Powell through the Rhodes Restoration Research Group (“R3G”) maintains a key set of research and implementation actions in his involvement with networks such as the Worldwide Fund for Nature (WWF), Working for Water, the Water Neutral Programme, the Eastern Cape Restoration Programme, and growing interest in the Carbon Market. Ted Avis is a Visiting Fellow from Coastal and Environmental Services, maintaining ties with the department through considerable undergraduate and postgraduate teaching.

NOTABLE HAPPENINGS IN THE DEPARTMENT

Rhodes University established the Vice Chancellors Green Fund as an outcome of the Environmental Science third year mini-research projects that assessed the

- carbon footprint of the University
- knowledge, attitudes and practices of the university community with respect to climate change and climate change mitigation.

As far as we are aware, Rhodes University is the first tertiary institution in South Africa to launch such a fund. Fundraising for the Green Fund started with a relay race through the streets of Grahamstown that co-incided with a global initiative to generate awareness around climate change on 10 October 2010 (10-10-10). The event was enjoyed by a large number of participants, and the Vice Chancellor supported the event substantively by donating R 1 000 for every Faculty and Division team that participated in the event. A total of over R 15 000 was raised in support of a fund that will support green initiatives on campus.

Through the Honours Class, the annual Schools Quiz “RU RnviroSavvy was organised with the financial support of Coastal and Environmental Services (CES). This event continues to be supported locally by schools and has grown substantially in terms of audience participation and the overall calibre of the event. In preparation for the main event, quizzes were run by the same students for both the Environmental Impact Assessment Course and for Kimberley Hall. The Schools Quiz itself was a showpiece with six schools participating in a tightly fought contest. The event was won by Kingswood College, with Victoria Girls coming in second and Nathaniel

Nyaluza in third place. A highlight of the event was “The Pollutants Tale”, which is an explosive look at chemistry and its links with the environment produced by Mrs Joyce Sewry and postgraduate students in the Chemistry Department.



In 2009 we were visited by scholars Jack Putz and Claudia Romero from the University of Florida for a period of six weeks, during which time they lectured undergraduate students and advised postgraduate research students on various aspects of their work. They initiated what has become known as the Twitter Club – a meeting every two weeks when we meet to discuss a topical environmental issue or piece of academic work. Their visit to Rhodes was funded by Rhodes University in support of drawing leading scholars to Rhodes.

In addition to the Joint Honours Programme with Botany in Biodiversity and Conservation, a joint Honours Programme was launched with Geography in Environmental Water Management (EWM). This programme started slowly with just three students in 2009, but it seems to be attracting more students who seek to practice as professionals in the water resources and management sector.

Mike Powell won the Vice Chancellor’s Environmental Award for his outstanding work in the field of carbon sequestration and ecosystem restoration in the Eastern Cape. He has links with agencies and individuals involved in ecosystem restoration and a growing interest in the Carbon Market. We are very proud of this recognition for a longstanding associate of the Department.

TEACHING

The focus of teaching for courses at second year is complex social-ecological systems and the links between environmental problems and society, economy and institutions and policies developed through these institutions. Teaching is generally undertaken by experts in their fields and courses seem increasingly attractive to students as shown by a fairly steady increase in student numbers over

the period from 1998 to 2010 (Figure 1).

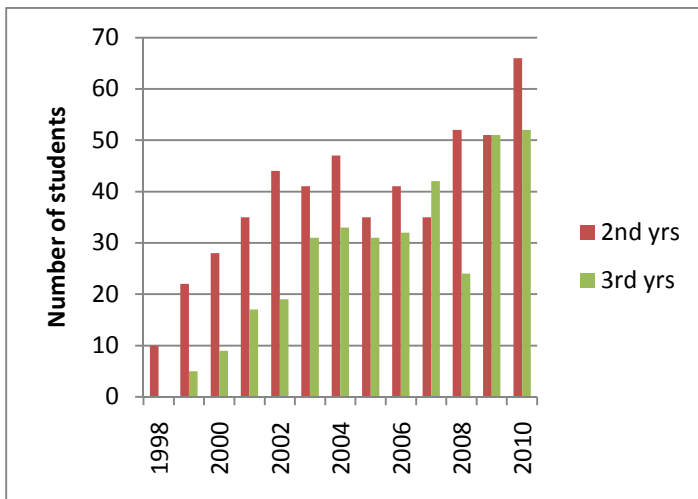


Figure 1: Number of students registered in second and third year of Environmental Science.

As part of their appointment to Rhodes University and in order to meet probationary requirements, new staff have to undertake a course in assessment run by the Centre for Higher Education, Research, Teaching and Learning (CHERTL), in order to enhance the effectiveness, validity and fairness of assessment practices at Rhodes University. Given that what students do is largely driven by assessment, this course is considered vital as part of maintaining good teaching and learning practice. Both Sheona Shackleton and Fred Ellery passed the “Assessors Course” (Sheona with distinction), and learned important lessons about closing the gap between curriculum development and assessment as a means of achieving curriculum outcomes. James Gambiza was awarded a Masters Degree in Higher Education in 2010. These achievements demonstrate the exceptional commitment of our staff to excellence in undergraduate student teaching and learning. We continue to teach in ways that are labour intensive and couple field work with theory such that links between knowledge and practice continue to be strengthened.

In 2009 third year students assessed the

- carbon footprint of Rhodes University
- knowledge, attitudes and practices of the university community with respect to climate change and climate change mitigation.

Following their final presentation to decision-makers Rhodes University established a Green Fund, which is championed through the Environmental Committee. In 2010 the third year

class studied the Grahamstown Southern Commonage and contributed useful ideas to its effective management.

Training of postgraduate students is another activity that we consider a priority given the national and regional emphasis on the production of highly skilled graduates. The graduation rates of postgraduate students in Environmental Science is shown in Figure 2. The number of Honours graduates per annum is quite variable, but of Masters and PhD students more consistent at 3-4 and 0-2

Currently our intake of students is greater than output, which is an area of concern since this situation is unsustainable. Not counted in this figure, but nevertheless of importance, was the graduation of five Masters students and three PhD students at UKZN that were being supervised by Fred Ellery since he joined the Department in 2008. The successful graduation of these students means that Fred can concentrate on supervision of students based at Rhodes University, which will hopefully accelerate graduation rates. The Department has developed a plan to accelerate postgraduate student throughput, an initiative that was championed by Charlie Shackleton. Strategies include improved project planning, monitoring through regular reporting to the Head of Department, incentives and disincentives and increased academic support.

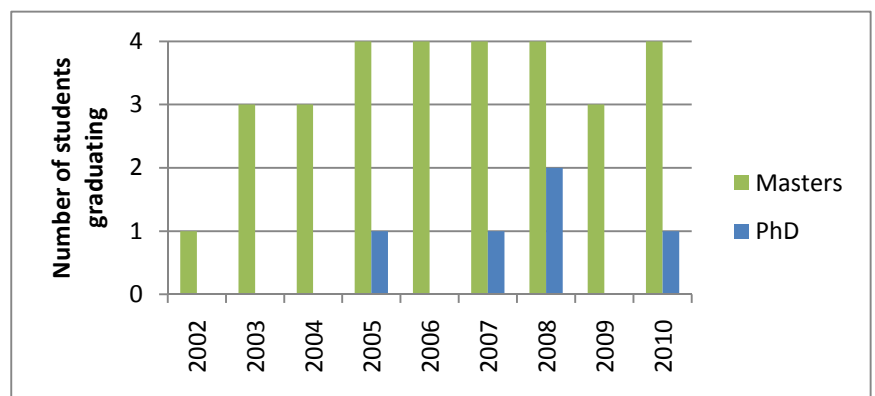


Figure 2: Number of postgraduate students graduating as Environmental Scientists respectively.

The Titles of postgraduate theses produced in the department over the past 2 years is provided in Box 3, indicating that postgraduate research continues to focus broadly on a combination of 2 or more of those areas that are central to sustainability: environment, society and economy.

Short courses are offered by staff in the Department to professional participants interested in furthering their education and training. The courses, which are normally filled to capacity are as follows:

- Community Based Natural Resource Management
- Environmental Impact Assessment
- Land Degradation
- Tools for Wetland Assessment

Charlie Shackleton is developing a similar course in Urban Forestry that will be run for the first time in 2011, and there is widespread interest in this course amongst urban planners and managers.

RESEARCH

The Department continues to produce a large number of high quality outputs as research publications, books and book chapters, conference presentations, research reports and policy briefs. The balance of undergraduate teaching, postgraduate training and research publications is a difficult act to manage given the talents, strengths and goals of individual staff members. Nevertheless, our output of refereed journal articles at approximately 13 per annum is high (Figure 3), with numbers in 2009 and 2010 being slightly higher than the average, which has much to do with the appointment of a full complement of staff in the Department since 2008. Our productivity in respect of book chapters, conference presentations and research reports is also consistently high.

In terms of the number of book chapters and journal articles, the number per staff member has remained remarkably consistent over the period 2000 to 2010 at an average of 5.7 (standard deviation of 1.6), with 2009 and 2010 being remarkably close to the average with 6.0 and 5.3, respectively. All the journal articles are in peer-reviewed ISI rated journals, and over 90 % of them are in international journals

A hallmark of our research publications is the extent to which they are multi-authored. For the publications of 2009 and 2010, there were well over 50 authors contributing to journal papers and book chapters. This reflects the multidisciplinary nature of what we do, and the extent to which we collaborate with others in our research. This applied also to the first book in which most of the department's staff contributed. Entitled "*Livelihoods and vulnerability in the arid and semi-arid lands of southern Africa: exploring the links between ecosystem services and poverty alleviation*" (Nova Publishers, New York. 242 pp. (ISBN 978-1-60876-940-7) the book was a collaborative effort led by Charlie Shackleton with contributions by Sheona Shackleton and James

Gambiza from the Department, as well as Etienne Nel and Kate Rowntree from Geography and two external contributors. It is also notable that postgraduate research commonly results in publication with the academic supervisor, testifying to the high quality of postgraduate research in the Department.



Figure 3: Number of refereed journal articles and book chapters

COMMUNITY ENGAGEMENT

The drive to ensure that universities and university departments participate in Community Engagement activities is not new to the Department as most of our work has always been positioned to meet fulfil this important activity. Community engagement activities are undertaken by Honours students in the:

- Khanya Maths and Science Club
- Annual Grahamstown schools environmental quiz

Postgraduate students at Masters and PhD level are involved in community engagement through their research as follows:

- Determining the restoration potential of Matiwane forest



Postgraduates in the Department have engaged with the national Working for Woodlands programme and local authorities in the Matiwane area of the Wild Coast to help plan and implement a programme to restore degraded forests. We have mapped areas of degradation over the last 60 years and used these to prioritise where restoration teams should concentrate their efforts. Secondly, we have quantified the carbon stocks on intact and degraded forests to determine how much carbon can be captured through restoration. This information is then used by the Working for Woodlands programme and local authorities to estimate potential income flows from trading in carbon credits.

- Promoting sustainable harvests of key natural resources in and around Wild Coast Nature Reserves



Rural communities are highly dependent on a wide range of natural resources such as firewood, medicinal plants, craft timbers and weaving fibres. Such resources are collected locally, but in many areas are depleted due to a variety of impacts on the natural vegetation, such as fires, grazing, over collection and land transformation. The Eastern Cape Parks requested the department to assist in determining what are the priority resources used by rural communities living adjacent to the four nature reserves on the Transkei Wild Coast. Once the key species were identified, we then worked with EC Parks in undertaking resource inventories in and around the reserves. Based on these, we have been able to advise which species can be used by local communities and which cannot. A participatory monitoring system is currently being designed.

- Restoration protocols for clearing alien invasive species

Alien invasive plants are a threat to approximately 8 % of the terrestrial area of

South Africa, impacting biodiversity, water yield and a variety of ecosystem services. The world renowned Working for Water programme has been clearing alien species for the last 15 years. Our department has assisted with a number of projects to develop environmentally friendly restoration protocols for the programme and private landowners, as well as determine the cost-efficiencies of various clearing and restoration options. The latter have the potential to markedly alter the way in which WfWater operates to be more cost-effective given available budgets.

- Use of alien species for income generation

Changes in legislation in and around protected areas in Karnataka State (India) have prohibited many rural dwellers from using natural resources from their immediate environment, which has led to serious deprivation. In an innovative programme a postgraduate in our department is looking at means of providing alternative livelihood opportunities through the use of alien invasive species. Preliminary interventions have included training over 60 households in the use of invasive species of the genus *Lantana*, to make furniture, which is then sold in local markets. Cash incomes to these households are now higher than was the case before the ban on harvesting of indigenous wild species. This programme also helps control the extent of *Lantana* in the protected areas.

- Integrating natural resources into urban planning

Many new migrants to urban areas continue to make use of key resources that were the mainstay of their previously rural livelihood, such as firewood, medicinal plants and agricultural products. Yet the scope, space and urban regulations frequently act against this, thereby constraining the transition from a rural to an urban livelihood and lifestyle. Our department has postgraduates working with local municipal authorities in two medium sized towns in South Africa on resources use patterns, and how urban planning processes and regulations can best accommodate the agricultural, gardening and resource use needs of new migrants to the city.

- Makana emerging black farmers: carbon farming proposal

Partnerships are at the core of the Municipality's successful approach to Local Economic Development. The envisaged carbon farming project is an excellent example

of a project that would be implemented through partnerships with various government departments, agencies and the private sector for the benefit of low-income communities and emerging rural economies. Consequently this proposed project was prepared by the Makana Municipality, the Rhodes Restoration Research Group (based at the Department of Environmental Science) and the Nollen Group. By bringing together government, the private sector and emerging farmers, the project stands to create a financially and environmentally sustainable business model that could be replicated in other rural areas. In addition to the obvious benefits of giving emerging farmers a business model that they are able to maintain, the project will be creating careers for 60-120 workers in low income areas within the Makana Municipality. The partners expect there to be spin-off in respect of establishment of small businesses (carbon measurement, carbon consulting) developed by local residents to service the project activities.

- Catchment and stream restoration in the Baviaanskloof

A number of postgraduate students based in Geography and Environmental Science are working in the Baviaanskloof based on the philosophy that restoration of catchments, alluvial fans and streams requires an understanding of how they fit into the landscape and why they degrade. This research is contributing to recommendations for restoration plans involving land owners, Statutory Agencies (Working for Water, Working for Wetlands, Working for Woodlands), voluntary organisations working to restore living landscapes (Living Lands, Presence) and other Universities (Wageningen University in the Netherlands).

- Safety issues in respect of the proposed Thyspunt Nuclear Power Plant

A Masters student in Geography is being co-supervised by Fred Ellery in order to shed light on debris flows that occur spontaneously following periods of heavy rain in the vicinity of the town of St Francis Bay. Such mass movements are very dangerous as they are capable of entraining vehicles, damaging infrastructure and destroying human life. The access road to the proposed Thyspunt Nuclear Power Plant has been destroyed in the past by debris flows, the most recent being in November 2007. Such hazardous events might

occur during transportation of nuclear material, which would be disastrous.

- Building local adaptive capacity to climate change through social learning



The four year project we have with the IDRC on “*Vulnerability, coping and adaptation within the context of climate change and HIV/AIDS in South Africa: Investigating strategies and practices to strengthen livelihoods and food security, improve health, and build resilience*” contains a strong social learning component. The objective of this component is to build local agency and people’s ability to respond and adapt to change and shocks by continual two way sharing of knowledge and research results with community members using several types of participatory methodologies and arts-based approaches. Through action research we will also ensure the transmission of relevant findings and issues raised by the community to various local authorities and other stakeholders. Thus, we will engage communities and their boundary partners (e.g. local government) in *collaborative social learning research processes* that focus on *expanding community choices, options and practices* from immediate coping strategies and options and intermediate adjustment

responses towards longer term adaptation practices, in order to enhance resilience.

- Zambia's readiness for REDD+ (Reducing emissions from deforestation and degradation) implementation

We have a student working on REDD implementation in Zambia. She is liaising closely with local stakeholders and will, as a community engagement dimension of her project, share her findings with various stakeholders (government, NGOs, CBOs) as well as suggest some strategies to improve REDD implementation in Zambia.

EXTERNAL EXAMINATION

The following people acted as external examiners during 2009 and 2010 for the undergraduate courses and postgraduate theses. This onerous task is vital in allowing us to gauge the level and quality of what we teach and research benchmarked against the experiences and expectations of others in South Africa and internationally. We are extremely grateful for their efforts and feedback.

Al Sa'ed, Rashed (Birzeit University, Palestine)
Ambrose-Oji, Bianca (Bangor University, Wales)
Cowling, Richard (Nelson Mandela Metropolitan University)
Covington, Wally (Northern Arizona University, USA)
Devereux, Stephen (University of Sussex, England)
Donovan, Cynthia (Michigan State University, USA)
Dovie, Delali (University of Ghana, Ghana)
Duncan, Mara (University of Leeds, England)
Hendricks, Howie (South African National Parks)
Hunter, Lori (University of Colorado, USA)
Kotze, Donovan (University of KwaZulu-Natal)
Marais, Christo (Stellenbosch University)
McKenzie, Bruce (Cape Peninsula University of Technology)
Olsson, Per (Stockholm University, Sweden)
Ostrom, Elinor (Indiana University, USA)
Plummer, Ryan (Brock University, Canada)
Romero, Claudia (University of Florida, USA)
Ross, Helen (University of Queensland, Australia)
Swallow, Brent (University of Alberta, Canada)
Witkowski, Ed (University of the Witwatersrand)

DONORS

The following is a list of agencies that funded research related activities of staff and postgraduate students in the department over the period 2009 to 2010. Without the support of funders such as these, our postgraduate teaching and research

activities would be seriously curtailed, and we are extremely grateful for generous support from:

Centre for Invasion Biology (Stellenbosch University)
Deutsche Akademische Austausch Dienst (DAAD)
Eastern Cape Parks
Working for Water through the Gamtoos Irrigation Board (GIB)
Faculty of Science, Rhodes University
Higher Education for Development (HED) and USAID
Indian Council of Cultural Relations (ICCR)
International Development Research Council (IDRC Canada)
International Foundation of Science (IFS) Stockholm, Sweden
Kent University via Ecosystem Services for Poverty Alleviation (ESPA) through UK Department for International Development (DFID)
Latin American Studies Association (LASA - USA)
Living Lands (Netherlands)
Ministry of Environment, Ministry of Science and Technology, and Government of the State of Ceara, Brazil
National Research Foundation (NRF)
Norwegian Programme for Development, Research and Education (NUFU) based at NORAGRIC,
Norwegian University of Life Sciences, Ås, Norway
Rhodes University Joint Research Council (JRC)
Rockefeller Brothers Fund (RBF) USA
South Africa – Netherlands Research Programme on Alternatives in Development (SANPAD)
South African National Biodiversity Institute (SANBI)
Swedish International Development Agency (SIDA)
University of Florida via Mellon Foundation -USA
Volkswagen Stiftung (Germany)
Water Research Commission (WRC) and University of KwaZulu-Natal (UKZN)
World Resources Institute (USA)



GUEST LECTURERS

Guest lecturers greatly enrich the academic programme of students in the department in exposing them to interesting theoretical and practical issues confronted in their discipline. We are very grateful to individuals who agree to do guest lectures for us as these are typically done voluntarily and for no reward. Thanks go to:

Nic Davenport of Coastal Environmental Services who spoke about municipal commonages in Makana Municipality, Eastern Cape.

Kevin Whittington-Jones of Coastal Environmental Services who spoke about water sanitation in Buffalo City, Eastern Cape.

Sandy Collings of Coastal Environmental Services who spoke about management of Mfolozi Floodplain based on a cost-benefit analysis

Claudia Romero from the University of Florida who spoke about climate change and Reduced Emissions from Deforestation and Degradation (REDD)

Jack Putz from the University of Florida who gave several lectures on climate change and climate change mitigation.

Warren Potts from the Department of Ichthyology and Fisheries Science at Rhodes who examined fisheries management in Angola



RESEARCH OUTPUTS

2009 JOURNAL PUBLICATIONS

Amutenya, N., Shackleton, C.M. & Whittington-Jones, K. 2009. Paper recycling patterns and potential interventions in the education sector: a case study of paper streams at Rhodes University, South Africa. *Resources, Conservation and Recycling* 53:237-242.

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Hajat, A., Banks, D., Aiken, R. & Shackleton, C.M. 2009. Efficacy of solar power units for small-scale businesses in a remote rural area, South Africa. *Renewable Energy* 34:2722-2727.

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Ward, C.D., Parker, C.M. Shackleton, C.M. 2009. The use and appreciation of botanical gardens as urban green spaces in South Africa. *Urban Forestry & Urban Greening* 9:49-55

Zuma, B.M., Tandlich, R., Whittington-Jones, K.J. & Burgess, J.E. 2009. Mulch tower treatment system Part 1: overall performance in greywater treatment. *Desalination* 242:38-56.

2009 BOOK CONTRIBUTIONS

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Collings, S. Economic consequences of ecological change: valuation of ecosystem services of Lake St Lucia and Mfoloi Floodplain, South Africa. Paper presentation at the Environmental Resource Economics Conference, Ritz Hotel, Sea Point, Cape Town 21-22 May 2009.



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Curran, P. & Shackleton, S. 2010. Investing in carbon, who will and why: an analysis of manufacturing businesses in the Eastern Cape. 41st Annual Geography Students Conference, Rhodes University, Eastern Cape: 28-30th August.

Curran, P. 2010. The research and development of a voluntary carbon standard for the subtropical thicket biome. Annual Thicket Forum, Assegai Trails, Eastern Cape: 6-8th October.

Ellery, W.N., Barnes, K., Humphries, M., Grenfell, S.E., Grenfell, M.C., Kindness, A. and Hughes J. 2010. Peat formation in the Mkuze Floodplain wetlands of Maputaland, South Africa, and its relationship with landscape evolution. Paper presentation: South African Association of Geomorphologists, Rhodes University, Eastern Cape. 4 September 2010.

Ellery, W.N. 2010. The structure and functioning of the Oyster Bay Headland Bypass Dunefields: application of science to environmental problems. Invited plenary paper, International Erosion Control Association – South

African Chapter, George, Western Cape. 29 September 2010.

Ellery, W.N. 2010. The impact of climate change on wetlands in South Africa. Invited plenary paper, Wetlands Indaba, Kimberley, Northern Cape. 27 October 2010.

Kota, Z. 2010. Last child in the woods? A tentative response to Louv's Nature Deficit Disorder from the Eastern Cape. Paper presentation, ISER research colloquium, Rhodes University, Eastern Cape. 1st November 2010.

Kull, C.A. & Shackleton, C.M. 2010. Adapting to new societies: the adoption of introduced Australian acacias. Paper presentation, International Conference on "Australia Acacias as invasive species", Stellenbosch, 4-8 October.

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McConnachie, M., Cowling, R., Knight, K., Marais, C. and Difford, M. 2010. Challenges and opportunities for state run restoration: lessons learnt from South Africa's Working for Water Project. Association for tropical biodiversity and conservation. (International Conference, Oral presentation), Indonesia, Bali.

McConnachie, M., Cowling, R. and Knight, K. 2010. A pragmatic methodology for bridging the gap between science and management. Bridging Conservation and Development in Latin America and Africa. (International Conference, Poster), USA, Florida.

Shackleton, S.E. 2010. A conceptual framework for integrating climate change adaptation into higher education learning and research that strengthens capacity to respond to climate change at multiple levels. ICID 2nd International Conference: climate, sustainability and development in semi-arid lands in Fortaleza, Brazil, 16-20 August 2010. Invited panellist.

Shackleton, S.E. & Kelly, K. 2010. Title of Paper: HIV/AIDS, climate change and the environment. Political Economy of HIV and AIDS. 7-9 March, East London (organised by Eastern Cape Socio Economic Consultative Council - ECSECC).

Shackleton, S.E. 2010. Linking livelihoods and ecosystem vulnerability in southern Africa: Consequences for conservation and development. Invited speaker, "Changing Contexts: The Planet's Rapidly Changing Environment." Session. "Bridging Conservation and Development in Latin America and Africa. Changing Contexts, Changing Strategies". January 28 - 30, University of Florida, Gainesville, Florida. Paper for Ecology and Society in preparation.

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Shackleton, C.M. Public lecture: 26 March 2010 - The contribution of non-timber forest products to rural livelihoods and poverty prevention in southern Africa (a fairly dry place). Ashoka Trust for Research in Ecology and the Environment, Bangalore (India).

Shackleton, C. M. Public lecture: 14 May 2010 - The impacts of HIV/AIDS on natural resource use and management in southern Africa. Bangalore Agricultural University, Bangalore (India).

Shackleton, C.M. Public lecture: 31 May 2010 - Private land conservancies as conservation instruments in South Africa. Nature Conservation Foundation, Mysore (India).

Thondhlana, G. Dryland conservation areas, indigenous people, livelihoods and resource values in South Africa: the case of the Kgalagadi Transfrontier Park. Global South workshop 4-8 October 2010, Graduate Institute of International and Development Studies, Geneva, Switzerland.

