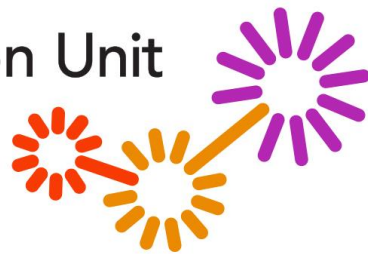




Plant Conservation Unit



Department of Biological Sciences

University of Cape Town

FIVE-YEAR REVIEW

2016-2020



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OVERVIEW OF THE PLANT CONSERVATION UNIT

Background

Mr Leslie Hill endowed the Chair of Plant Conservation to the University of Cape Town in mid-1991 and the first incumbent, Richard Cowling, created the Institute for Plant Conservation in 1992. The name of the unit was changed to the Plant Conservation Unit (PCU) in 2006 and Timm Hoffman and Lindsey Gillson have been the full-time academic staff throughout this period. Details of the history of the unit, as well as changes in staff prior to 2006 are provided in the 2011-2015 report (see: <http://www.pcu.uct.ac.za/pcu/about/review>).

This is the sixth review of the Plant Conservation Unit (PCU) since 1992 and covers the five-year period 2016-2020. Because the review is being held in July 2021, some material from the current year has also been included. Information derived from the Plant Conservation Unit's website (see: <http://www.pcu.uct.ac.za>) has been used in preparing this Self-Review Portfolio. The website has considerable additional up-to-date information about the PCU and should be consulted for further details about our staff and students as well as our research activities.

Current size and shape

The position and period of tenure of PCU staff and students for the period 2016-2020 are shown in Appendix 1 and a summary is provided in Table 1 below. The PCU's permanent staff complement is comprised of two academic staff while two Junior Research Officers, six Research Assistants and two NRF Interns have made up the contract staff over the reporting period. Emeritus A/Prof John Hofmann leads the biocontrol research programme which has been aligned with the PCU over the reporting period. The PCU has also hosted Dr Joe McAuliffe (Director of Research, Desert Botanical Garden, Phoenix, Arizona) during his period of sabbatical leave in 2016. Four Honorary Research Associates of the PCU contribute significantly to our research activities through their publications and post graduate student supervision. Seven postdocs and 41 postgraduate students either have been or are currently associated with the PCU. Details of the postdocs and postgrad student categories are provided later.

Table 1: Staff, students, and other categories of people associated with the PCU for the period 2016-present.

Category	Past (2016-2020)	Current (2021)	Total (2016-2021)
Permanent Staff	2	2	2
Contract Staff	4	6	10
Other categories (Emeritus, HRAs, etc.)	2	4	6
Postdocs	2	5	7
PhD	7	10	17
MSc	3	3	6
MSc (minor dissertation)	8	1	9
Hons	9	0	9
Total	36	30	66

Vision and mission

The PCU's Vision and Mission statements have been developed in consultation with our students and are reflected below.

Vision

To be a transformative, inclusive, African-centred research and postgraduate training centre, delivering world class research that contributes to the fair and just conservation of African ecosystems and the sustainable and adaptive management of landscapes and ecosystem services.

Mission

To contribute to the fair and inclusive conservation of African biodiversity and the sustainable and adaptive management of ecosystem services, through excellent interdisciplinary research that brings a past-present-future perspective and that includes the ecological, environmental and social dimensions of landscapes. To provide a supportive, vibrant, and inclusive environment that nurtures the skills and passions of tomorrow's conservationists through undergraduate teaching and postgraduate research.

We also view our activities as transformative. We believe that what we do through our research, teaching and socially responsive activities has important transformative consequences for the individual, the institution, the country, and the continent. Through our research programmes we attract a diversity of students. While we draw heavily on the pool of students from UCT's undergraduate and honours programmes, many students also join the PCU from other institutions, based on our reputation and our research activities and profiles.

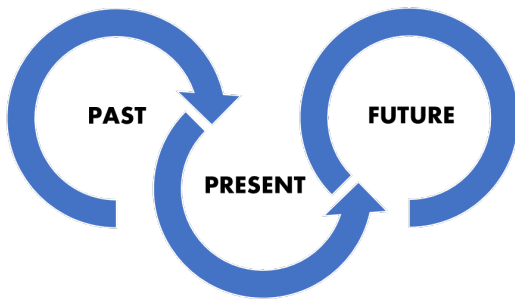


Some of the PCU staff and students at Silvermine dam in May 2021.

OUR RESEARCH

Nature of the research

Many of the transformations and challenges facing the environment and society are linked to the impacts of human activities on biodiversity, landscapes, and ecosystems. The challenge now is to use human ingenuity to create, conserve and restore environments and landscapes that meet the needs of people while remaining within Earth's safe operating space. This challenge requires an interdisciplinary approach to understand the interplay, trade-offs and complexities of competing human, biological and environmental imperatives. In the face of this complexity, the work of the Plant Conservation Unit provides a perspective on past variability that can help in defining realistic future scenarios and in shaping ecosystem management that builds sustainability, resilience and adaptive capacity of ecosystems and social-ecological systems.

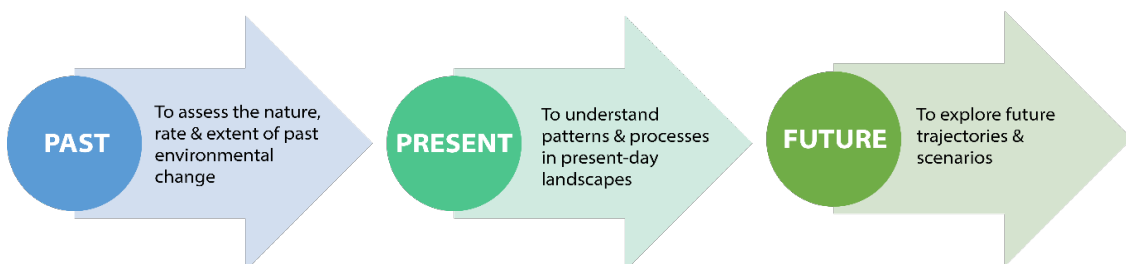


This past-present-future perspective is a key thread in our research, which combines a range of methods to answer questions about long term change, ecosystem variability and social-ecological resilience. Landscapes are the scale of observation, where we understand landscapes to embody biological, cultural, historical, environmental, and social aspects. This provides a wealth of opportunity for interdisciplinary collaboration, and our work draws on botany, ecology, palaeoecology, repeat photography, historical ecology, GIS, theoretical ecology, and conservation philosophy.

We are keenly aware of the social-ecological context of our research, as well as our role in training young scientists and in transforming the discipline of conservation. We endeavour to make our work relevant to pressing conservation questions such as the management of herbivory and fire, the degradation and restoration of ecosystems, and how land-cover change affects ecosystem service provision.

Aims and objectives of research

Research within the Plant Conservation Unit is organised broadly around the themes of historical ecology and palaeoecology which have a shared focus on a past-present-future continuum with the following broad aims and objectives:



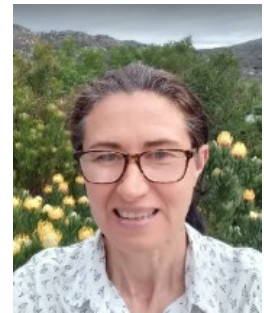
Activities are closely integrated through the development of joint projects and publications, the co-supervision of students, the co-teaching of undergraduate and post-graduate modules and the joint development of workshops and conference presentations. This integration is outlined briefly in the descriptions provided by Hoffman and Gillson below of their research aims and objectives.

“The main aim of the work on historical ecology is to understand how southern Africa’s extraordinary diversity and its rich resources have changed over time in response to land use and climate. I use repeat fixed-point photography, the historical archive and long-term monitoring studies in my research. I use this information to inform conservation and management policy and practice particularly in terms of the long-term effects of land use and climate change on the biota of the region. Lessons learnt in this region have universal significance particularly in the context of global change research and the development of sustainable land use practices.”



Professor M. Timm Hoffman, Director

“The over-arching goal of the Applied Palaeoecology Lab is to mainstream palaeoecology into biodiversity conservation and sustainability science, with a focus on African ecosystems. We carry out applied research that investigates ecosystem dynamics over time and interprets these data using theoretical frameworks from non-equilibrium ecology. We then translate our findings into forms that are relevant to biodiversity conservation, ecosystem management and the sustainable use of natural resources. An important part of this is to embed palaeoecological data within interdisciplinary projects that combine the study of long-term ecological change with other techniques such as stakeholder engagement, modelling and scenario planning. Within this framework, my further aim is to contribute to building capacity in this field through the training of young researchers, especially those from Africa.”



Professor Lindsey Gillson, Deputy Director

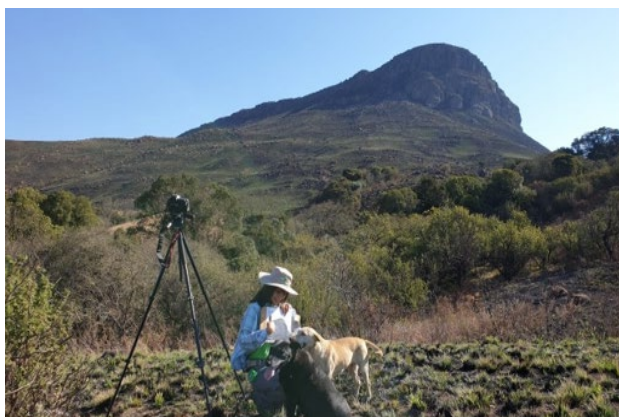
Research approach

We integrate a range of methods with the aims of reconstructing past environmental change and understanding how past processes have shaped the patterns in landscapes that we see today. We apply this knowledge in exploring how landscape change affects ecosystem service provision and livelihoods and the resilience and adaptive capacity of social-ecological systems. This knowledge helps to inform the exploration of future scenarios, the conservation of biodiversity and the sustainable management of ecosystem services.

Our main areas of expertise are in historical ecology and palaeoecology. Increasingly, we rely on stakeholder participation and various modelling techniques (DGVMs, System Dynamics Models, Structural Equation models), alongside stakeholder engagement, to explore means of simulating past change and exploring future scenarios.

Our focus on historical ecology draws on repeat ground and aerial photography, landscape ecology, GIS and satellite imagery, as well as vegetation surveys and monitoring to understand long-term environmental

change. Through this we can establish baseline conditions and can better understand the trajectory of environmental change for the biomes and key indicator species of southern Africa. Land degradation assessment is a major focus of our work as is the establishment of a set of long-term monitoring sites for the region. Repeat photographs are the basis for the monitoring work which has recently expanded to include an active citizen science initiative called rePhotoSA (<http://rephotosa.adu.org.za>). We also maintain a long-term research initiative established in the communal area of Paulshoek, Leliefontein in Namaqualand. At this site we investigate the impact of natural resource use on Namaqualand's landscapes in terms of the changing social, economic and climatic environments of the region. Over the years we have built up an interdisciplinary understanding of how the environment is perceived and used by local people.

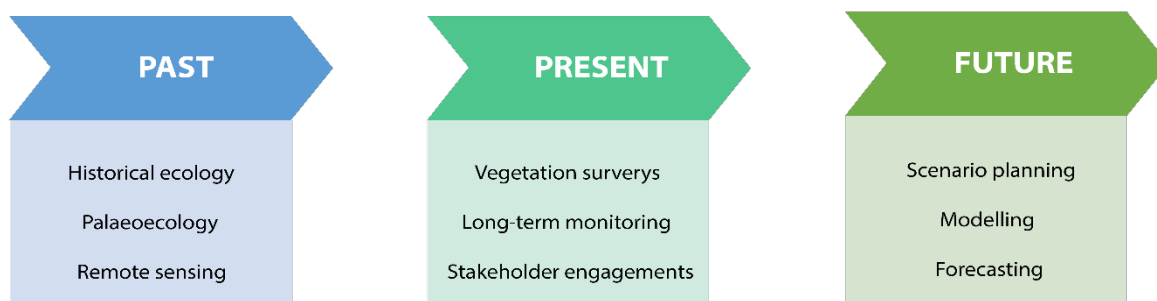


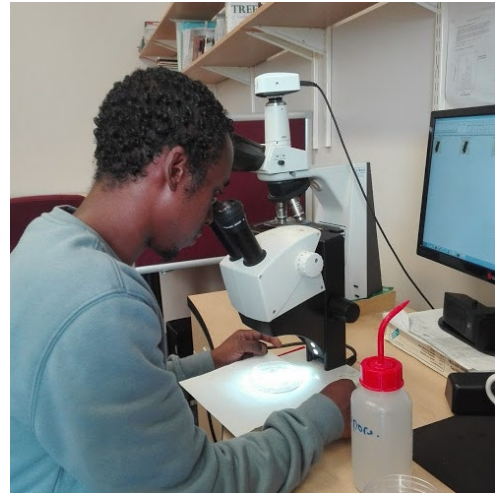
Hana Petersen teaches repeat photography to a pair of farm dogs (2019). Photo credit: Courtney Hundermark.



Ellelwani Nenzhelele (left) with PCU staff member, Mariana Lot (right) collecting data in Paulshoek, Namaqualand.

The palaeoecological analyses utilise fossil pollen, charcoal, diatoms, and spores from sediment cores to reconstruct changes in vegetation, fire, climate, hydrology, and herbivory over centennial - millennial timescales. These data are used to enhance understanding of ecosystem variability and resilience and to apply this knowledge to ecosystem management and conservation. Increasingly, we are developing the capacity to model past environmental change, and plan to utilise these models in simulating future scenarios of biodiversity and ecosystem service provision under different climate change and management scenarios.





Janine Steytler and Adele Julier using the vibracorer (left). A sediment core from Grootbos Private Nature Reserve (centre). Tsilavo Razafimanantsoa analysing macrocharcoal (right).

Focal areas

The Greater Cape Floristic Region (GCFR), which comprises the Fynbos, Succulent Karoo, Renosterveld and Afromontane Forest biomes, presents a wealth of botanical, ecological and social-ecological research opportunities. Many of our projects are based within the GCFR. While our research is focused on the winter rainfall region we work across a wide range of biomes in southern Africa. We also have long-standing interest and expertise in the Desert, Grassland and Savanna biomes of southern Africa, with past and present research focused on Kruger National Park and surrounds, Bwabwata National Park, Namibia, Mozambique, and the Drakensberg. The PCU has a strong and growing presence in Madagascar, with current projects focused on the Western Dry Forests, and Central Highlands (Fig. 1).



Estelle Razanatsoa (3rd from left) and team on a coring expedition, Avenue of Baobabs, Madagascar. Photo: Lindsey Gillson.

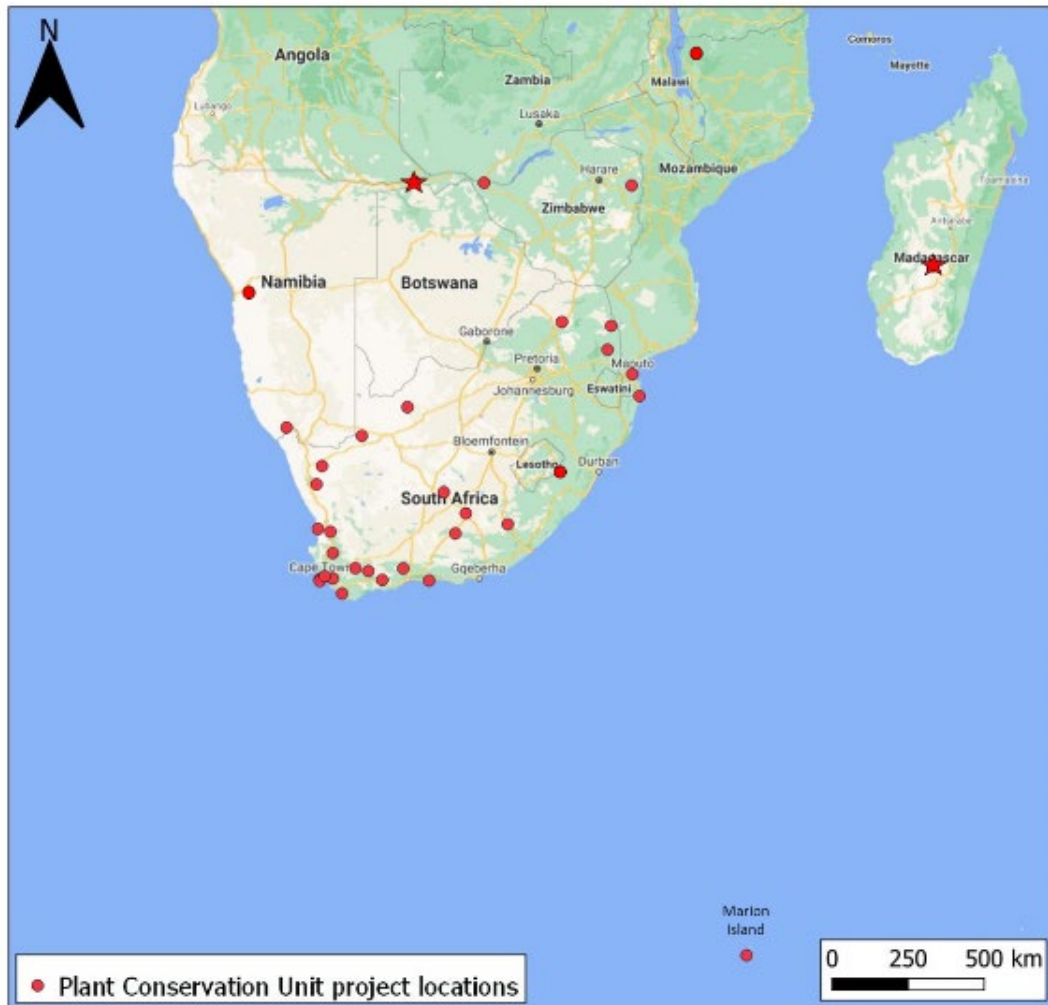


Figure 1: Location of PCU projects (2016-2020). A star symbol indicates a cluster of projects.

The location of our projects reflects our focus on the ecology and conservation of African ecosystems and provides opportunities for regional and inter-regional comparison and synthesis. The cross-cutting themes of our research transcend geographical boundaries and keep our research focused and cohesive.

Research infrastructure

The PCU comprised a suite of offices, computer lab, meeting / tearoom, palaeoecological lab, and microscope room. The computer lab also housed the scanners which were used to scan the hard copy images of the historical slide and photograph collections accessioned by the PCU. The physical structure was burned down in the fire of April 2021, leaving only the palaeo-lab and microscope room intact. Hoffman’s photo and archival collection were lost, along with cameras and scanners. The collections are irreplaceable, but about 30,000 images have been digitised. The university has indicated that the PCU will be rebuilt during 2021 -2022. We are working with the Department of Biological Sciences, the Faculty of Science and the wider University community (e.g. Development and Alumni Department (DAD)) to explore how this can best be done.

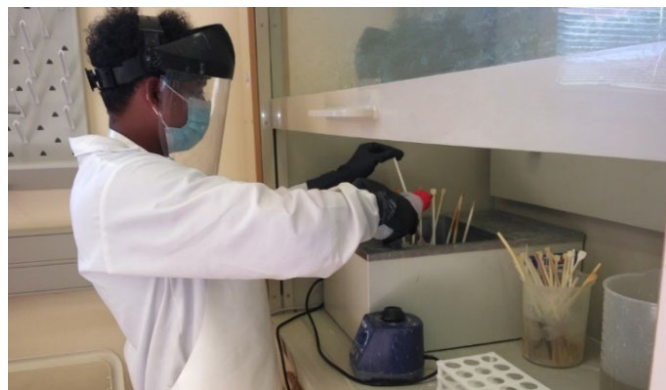


Timm Hoffman at Aukas East in the Pro-Namib, Namibia.

The palaeoecological lab has facilities for processing fossil pollen and other palaeoecological proxies including charcoal, diatoms and spores. We have brightfield and phase contrast microscopes as well as a pollen reference collection for the Western Cape (the savanna reference collection was also lost in the fire). The lab has recently been enhanced with a magnetic susceptibility kit, only the second such facility in South Africa. We have upgraded the lab with a new chemical safety storage cabinet, and we have updated computer facilities. A new cold-room for the storage of sediment cores is planned. In the department, we have access to an XRF analyser and furnaces for Loss on Ignition. Stable isotope analysis takes place in the Archaeology department and samples are sent to commercial labs for AMS radiocarbon dating. We had hand-held coring equipment for the collection of sediment cores, but this was burned in the 2021 fire. We supplement this with a mechanical coring device, kindly loaned by the Environmental and Geographical Sciences Department.



Coring at Jonkershoek, February 2021.



Fetra Randriatsara processing sediment samples for pollen and charcoal analysis in the palaeolab.

We have a 4 x 4 research vehicle for field work, which was purchased in 2017 as a replacement for the one burned during campus protests in 2016.

Research culture and capacity development

The PCU is currently host to 14 MSc and PhD researchers as well as five Postdoctoral Research Fellows. Research degrees are usually focused on the themes of landscape change and the implications for biodiversity conservation and ecosystem management. There is a strong emphasis on the ecology and conservation of the Greater Cape Floristic Region. Other focal areas include the Nama-Karoo and savannas of southern Africa and the highlands and dry forests of Madagascar. Palaeoecology, repeat photography and ecological field work are our core methodologies, but we foreground interdisciplinary research that can include elements of ecological monitoring, GIS, remote sensing, modelling and stakeholder engagement.

As well as training in scientific research methods and writing, we provide postgraduate researchers with a broad scientific training and transferable skills that include data analysis, presentation skills, and opportunities to build networks at national and international levels. We encourage PCU members to assist one another and try to foster a diverse, vibrant and welcoming postgraduate community. At the PCU, we endeavour to create a space where researchers feel inspired, valued and supported. As well as building their practical and professional skills, we aim to grow confidence, encourage agency, and foster a spirit of community.



PhD student Gina Arena (3rd from left) collecting data along a line transect at Middelburg, Eastern Cape (left) and postdoc, Dr Desale Okubamichael measuring a cycad at Springs Nature Reserve, Eastern Cape.

As well as regular individual supervision meetings, we have a mid-year review with each student where we provide feedback on progress, identify any issues and challenges, and plan the year ahead. This year we will also have an internal symposium in July and a bigger event in November when we will share our findings with key collaborators and stakeholders. We encourage professional behaviour, scientific rigour and ambitious yet collegial behaviour.

In addition, we arrange outside training in the additional skills that are needed for our inter-disciplinary work, for example in GIS, modelling and quantitative techniques. In 2018, A/Professor Anneli Ekblom visited from Uppsala University, and gave workshops and seminars to PCU members including biocultural heritage

and integrated landscape analysis. She also gave departmental seminars on active learning and CEMUS, a student led institute of which she was formerly director. In 2019, we hosted Dr Richard Telford from Bergen University who ran a week-long course in R for palaeoecologists. Dr Alistair Seddon, also from Bergen was due to visit in 2019 to train the palaeoecology team in EcoRe3, a technique that analyses resilience and thresholds in palaeoecological data (funded by SANORD). This will be rescheduled when COVID-19 travel restrictions are eased. Dr Joseph McAuliffe visited the PCU in 2016 as part of his sabbatical leave from the Desert Botanical Garden in Phoenix Arizona. He gave a departmental seminar and trained students in field techniques and soil analyses while completing his research in the Succulent Karoo and which resulted in three publications.

We also aim to develop the national and international profiles our students and postdocs by promoting their work and increasing its application in conservation, restoration, and sustainability science. This also positions them to be competitive in the job market, both in academia and in the conservation sector and beyond.



Cherie Forbes (flanked by Lindsey Gillson and Timm Hoffman) (left), Estelle Razanatsoa (centre) and Wesley Bell (right) after graduation.

We are keen to contribute to transformation at UCT and emphasise building capacity in African scientists, especially women and people of colour. The PCU is diverse and vibrant with its members coming from a range of countries. Thirty-five (58%) of the 60 staff and students (excluding visitors and HRAs) who have been associated with the PCU over the last five years are South Africans. Thirteen people (22%) are from neighbouring African countries such as Zimbabwe (4 people), Madagascar (3), Botswana (2), Ethiopia (1), Mozambique (1), Namibia (1), and Nigeria (1). The remainder (12 people or 20% of the staff and students of the PCU) is from Europe (UK (4), Italy (1), Spain (1), Finland (1)) the United States of America (1), and Japan (1).

A breakdown of the 60 staff and students by gender and race is shown in Table 2. Race categories are the same as those stipulated by the university and the NRF. Of the 60 staff and students (excluding visitors and HRAs) who have been associated with the PCU over the last five years, 67% are female and 42% are people of colour (Table 2).

Teaching and Training

We are a research-led unit, and pride ourselves on carrying out research with a past-present-future focus that has relevance and application to the conservation of African ecosystems, while maintaining a global perspective. We use our research to inform and inspire our undergraduate and postgraduate teaching. We are committed to keeping our teaching Africa-focused and relevant to South Africa's social-ecological context. We are especially focused on the Greater Cape Floristic Region (i.e. the Fynbos and Succulent Karoo biomes), but also have extensive experience in other biomes such as the Nama-Karoo, Albany Thicket and Savanna biomes. Where possible, we involve our postgraduate and postdoctoral team in teaching as they provide valuable role models for younger students.

Undergraduate teaching

BIO3013F Global Change: Timm Hoffman teaches a module on “*Global change and its impact in Africa*” which draws on the ideas from anthropology, environmental history, ecology and global change to discuss issues concerned with deforestation, desertification and pastoralism on the continent.

BIO3014S Conservation: genes, populations, ecosystems. Lindsey Gillson convenes this course, teaches an introductory module on the origins, philosophy, practice and theoretical underpinnings of conservation as well as a module on “*Ecosystem Processes and management*” that emphasises the use of palaeoecology in conservation.

BIO3018F Ecology and Evolution: Timm Hoffman teaches a module on “*African biogeography over space and time*” which outlines the major biomes, biogeographical regions and floras of Africa in terms of their diversity, evolutionary history and disturbance regime.

For further details of undergraduate courses, please visit the following websites:

- [UCT Biological Sciences Department](#)
- [UCT Science Faculty](#)

Postgraduate taught courses

Honours BIO 4000W

PCU Staff offer the following modules to the Honours in Biology course.

Applied Palaeoecology and Ecosystem Change (Lindsey Gillson): Showcasing work in the PCU palaeoecology laboratory, we explore the application of palaeoecological data in African ecosystems including the conservation and management of savannas, Madagascar, and the Cape Floristic Region. We also provide an overview of palaeoecological methods and an introduction to quantitative techniques.

The historical ecology of the Cape (Timm Hoffman): This 5-day field course explores the socio-ecological environments of the winter rainfall region of South Africa and runs every second year. Students are exposed

to the environments of the West Coast, the Cederberg and broader Namaqualand region of the western part of South Africa, including the quartz rich Knersvlakte.

For further details of Honours in Biology, please visit the [departmental website](#).

BIO5007: Masters in Conservation Biology

Members of the PCU contribute to five weeks of teaching on the MSc in Conservation Biology (BIO5007H) and the ACDI Masters in Climate Change and Development (EGS 5031F)

Module in Community Ecology (Robert Thomson and Timm Hoffman)

This module provides an overview of the structure and dynamics of biological communities as well as the theoretical and empirical bases that have underpinned modern concepts in the field. Most of the 2-week module is spent in the field (e.g. Tswalu Kalahari Reserve) examining how these ideas can be used in a practical research project.

Module in Biodiversity and Climate Change (Lindsey Gillson, convener)

Climate change has a major influence on biodiversity distribution and ecosystem function. This module explores the science and practice of conservation in a changing climate. Local, national and international examples are explored, and a range of local experts engage with the class. A summary of this module, for non-biologists, is presented to the ACDI class.



The Conservation Biology Masters Class of 2019 on a visit to Witzands Aquifer Nature Reserve.

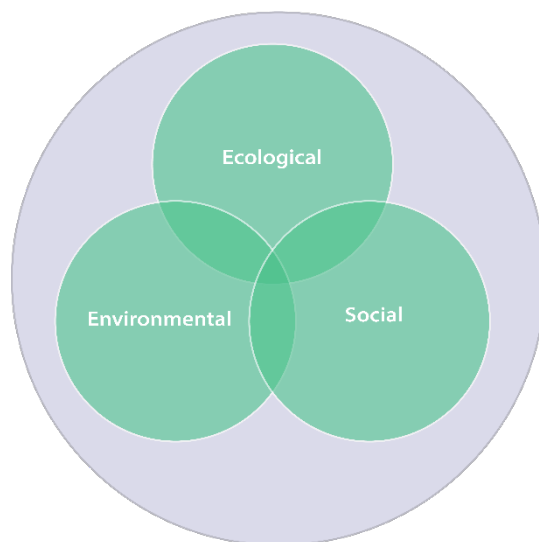
Interdisciplinary research collaboration and international networks

Landscapes are complex and change in response to multiple interacting factors including climate, land-use, biotic interactions, and disturbance. These changes will have consequences for biodiversity and ecosystem service provision, that will in turn affect livelihoods and sustainability. To address complex questions about

landscape change and make decisions about their management, we need to consider a range of drivers and stakeholder perspectives. An interdisciplinary focus is therefore essential.

Our focus on landscapes provides a focal scale for interdisciplinary research that brings in biological, cultural, social, and environmental dimensions. Our research is founded in biology but interfaces with multiple interacting disciplines including ecology, palaeoecology, environmental change, social-ecological complexity, resilience theory, historical ecology, land degradation, restoration ecology and biodiversity conservation.

Social-ecological context



This requires collaboration locally, nationally, and internationally. In the department we work with ecophysiologicals, ecologists and systematists including Ed February, Mike Cramer, Adam West, Samson Chimphango and Muthama Muasya, Claire Spottiswoode, as well as William Bond, with whom we co-supervise students. Collaborators in other departments, universities and institutions include Kelly Kirsten (UCT-Geology), Rachel Wynberg (UCT-EGS), Gina Ziervogel (UCT-EGS), Pippin Anderson (UCT-EGS), Vernon Visser (UCT-SEEC), Cheryl Walker (Stellenbosch-Anthropology), Guy Midgley (Stellenbosch-Botany), Richard Cowling (Nelson Mandela University), Igshaan Samuels (ARC), Tim O'Connor (SAEON), Joh Henschel (SAEON) and Colleen Seymour (SANBI). A review our publication list (Appendix 3) illustrates the wide network of international collaborators which include Anneli Ekblom (Uppsala University), Richard Telford (Bergen University), Alistair Seddon (Bergen University), Rick Rohde (University of Edinburgh), Joe McAuliffe (Desert Botanic Garden, USA), and Zander Venter (NINR-Norway) as key partners.

Engaged scholarship and social responsiveness

One of the central aims of the PCU is to mainstream our work on long-term change into biodiversity conservation and ecosystem management. Examples of our contributions are detailed below.

Leslie Hill Succulent Karoo Trust

The Leslie Hill Chair (Hoffman) is an ex-officio member of the Leslie Hill Succulent Karoo Trust. This trust is administered by WWF-SA and is dedicated to the development of a network of conservation areas to

conserve the diversity of particularly the succulent flora of the region. More than 260,000 ha have been added to the protected area estate by the LHSKT since its inception in 1995.

Paulshoek village

Many of our projects bring the PCU into direct contact with civil society such as the community of Paulshoek in Namaqualand. Our work in this village of 500 people has been running since 1996. Several long-term data sets are maintained in the 20,000 ha commons including data on climate, crop production, livestock production, plant phenology and vegetation change in permanent plots. The PCU employs a member from the community (Ms Marianna Lot) as a research assistant. Marianna's role is to collect field data and to assist researchers and post-graduate students who work in the village and surrounding commons and to share with them her knowledge of the area.



PCU staff member, Ms Mariana Lot in a field of daisies in Paulshoek, Namaqualand (left) and staff and parents from the primary school in Paulshoek preparing beds for the school vegetable garden.

rePhotoSA

This citizen science project was launched in 2015. It emerged as a collaboration between the PCU and the Animal Demography Unit at UCT and citizen scientists. Full details of the project can be found at <http://rephotosa.adu.org.za> including instructions on how to re-take historical photographs and upload them to the website. The aim of the project is to build a network of active citizen scientists willing to travel to locations where historical photographs have been taken and to retake the same view and upload the photograph to a searchable website. Since the launch of the project more than 250 repeat photographs have been uploaded by citizen scientists.

Arid Zone Ecology Forum

Through its focus is on Southern Africa's arid and semi-arid regions, the Plant Conservation Unit has also taken a special interest in the Arid Zone Ecology Forum (AZEF). This is a dedicated forum for researchers and especially students to meet once a year and share their research findings. Several PCU members have served and continue to serve on the AZEF executive committee. The PCU has provided support to AZEF in various ways since 2014.

Applied Palaeoecology

The applied palaeoecology lab aims to produce research of relevance to pressing conservation and environmental questions. Examples include the use of palaeoecology in fire management and the restoration of degraded ecosystems. This involves consultation and collaboration with partners in local and national conservation organisations including SANParks, SANBI, SAEON, Elandsberg Private Nature Reserve and the Grootbos Private Nature Reserve (GPNR). PhD work by Glynis Humphrey, for example, has already contributed to fire management planning in Bwabwata National Park, in Namibia. At the Elandsberg Private Nature Reserve, Western Cape, Cherie Forbes palaeoecological work helped to identify recommendations for reduced grazing and burning in order to return the reserve to a condition similar to that prior to the onset of intensive agriculture in the 1950s (Forbes et al 2018).



Cherie Forbes running a participatory stakeholder workshop in Portersville, Western Cape as preparation for developing a system dynamics model.

Science organisation

Lindsey Gillson has served on the PAGES (Past Environmental Changes) Scientific Steering Committee since 2016. Gillson joined the Centre Advisory Committee of the Australian Research Council (ARC) Centre of Excellence for Australian Biodiversity and Heritage (CABAH) in 2019. She was a Lead author on IPBES Chapter 3, Africa Regional Report (2016-2018); Status, trends and future dynamics of biodiversity and ecosystems underpinning nature's contributions to people.

Gillson was on the Steering Committee for African Climate and Development Initiative until 2017 and has recently joined the steering committee for UCT's Sustainability Summit, which will take place in September 2022. In this role she is also assisting with the Transdisciplinary theme led by Prof Sheona Shackleton of ACIDI.

Editorial work

Lindsey Gillson was Associate Editor of *Anthropocene* (Impact Factor 4.3) from 2016 -2020. In 2020 she took on a role as Specialty Chief Editor for Plant Conservation, for a new journal, *Frontiers in Conservation Science*.

Gillson and Hoffman regularly review articles for many journals including *African Journal of Ecology*, *African Journal of Range & Forage Science*, *Applied Vegetation Science*, *Austral Ecology*, *Biological Reviews*, *Climatic Change*, *Conservation Science and Practice*, *Ecography*, *Ecosystems*, *Ecological Monographs*, *Frontiers in Ecology and Evolution*, *Global Change Biology*, *Journal of Arid Environments*, *Journal of Biogeography*, *Journal of Ecology*, *Journal of Vegetation Science*, *Landscape Ecology*, *Proceedings of the Royal Society series B*, *Quaternary Science Reviews*, *Science*, *Vegetation History* and *Archaeobotany*.

REVIEW OF THE LAST FIVE YEARS

Reflections on our response to previous five-year review

In response to feedback received after our 2015 review, we have made significant progress in the following areas:

Coherence and Focus of the Research Agenda

- We have continued our focus on the integration of long-term data into conservation and planning.
- Gillson and Hoffman have had several strategic meetings about the direction and cohesion of the Unit and succession planning.
- rePhotoSA as a citizen science platform for repeat photography has been consolidated and expanded.
- Hoffman has supported Gillson in increasing the emphasis of her work on the Winter Rainfall region, and this has been reflected in recent and current postgraduate and postdoctoral projects (MacPherson, Holden, Forbes, Poulsen, van Blerk, Manzano, Chirango, Hoffenberg, Steytler, Prader) as well as co-authored publications.
- The synergy between repeat photography and palaeoecology has been strengthened by developing hypotheses generated at the decadal scale from photographs and using these as a basis for palaeoecological projects that test these ideas.
- We have revisited our Vision and Mission Statement in consultation with the whole group.
- The website has been updated to reflect these developments.
- The biocontrol group has made useful contributions to the PCU's teaching efforts but their integration into our research programme has not been successful. Their ongoing status within the PCU requires a decision.

Transformative Nature of PCU activities

- We have explored inclusivity at the Unit and departmental levels, seeking feedback from members of the Unit.
- We have improved exposure of our student's work through international conference participation, popular articles and opportunities to develop leadership roles.

- We have provided training by external parties to boost student’s skills sets, competitiveness and employability.
- We have developed a Code of Conduct for the Unit (see Appendix 5).

Strengthened Collaboration and Integration

- We have improved interaction with Cape Nature and SANParks through new projects in Table Mountain National Park and Jonkershoek Nature Reserve.
- We have developed and strengthened collaboration with Private Nature Reserves e.g. Elandsberg, Drie Kuilen and Grootbos. These projects interface well with the work of ecophysicologists in the department (Cramer and West).

Capacity Building, Student Throughput, Financial Security and Succession

- We have successfully found funding for postdoctoral work and have hosted seven postdocs throughout the review period.
- Two DST interns have been hosted at the PCU to work on the historical ecology project. One of these interns has continued as a research assistant while the other has gone on to complete an Honours degree at UWC under the co-supervision of Hoffman.
- The PCU research vehicle was replaced with the help of the Science Faculty.
- The capacity of the palaeo lab has been improved through the purchase of a Magnetic Susceptibility kit and refrigerated storage space.
- MTH and LG have developed a succession plan (see below) and have worked to position Gillson to seamlessly continue the work of the PCU, specifically our niche in long-term data and its importance in the conservation and management of the winter rainfall region. We have identified skills e.g. GIS, modelling, quantitative techniques that would be especially beneficial to the Unit although we acknowledge that the Plant Conservation Unit itself will not be involved in decisions around staff appointments.

Students graduated

In the last five years 27 postgraduate students have completed their degrees under the supervision of the two academic staff at UCT (Table 3; Appendix 1). Ten PhD, and four MSc are currently busy with their studies and will graduate at varying times over the next three years. This excludes the two postdocs who have completed their stay at the PCU and the five postdocs currently active within the group.

Table 3: PhD, MSc and Hons students who have graduated over the period of review.

Degree	2016	2017	2018	2019	2020	Total
PhD	-	1	3	2	1	7
MSc	1	1	1	-	-	3
MSc (minor dissertation)	3	1	1	1	2	8
Hons	3	3	-	2	1	9
Total	7	6	5	5	4	27

Papers published

PCU staff and students have published nearly 150 articles over the reporting period (Table 4, Appendix 3). Emphasis is placed on peer-reviewed journal articles of which there are 94 as well as peer-reviewed book chapters of which there are 4. Papers that have either been published in 2021 or are in press have been included in this count since they reflect work completed in the reporting period. The years 2018 and 2019 were the most productive years for the PCU and relate to two periods of sabbatical leave taken by Hoffman and Gillson when administrative and teaching responsibilities were low. Many of the popular articles and media communications relate to the rePhotoSA citizen science project which demands frequent engagement with the target community.

Table 4: Number of publications in different categories published by PCU staff, Honorary Research Associates (HRAs), postdocs and students over the period 2016-2021. Papers in press in 2021 are included.

Degree	2016	2017	2018	2019	2020	2021	Total
Book	1	-	-	-	-	-	1
Journal articles	16	11	20	20	13	14	94
Book chapters	1	1	1	-	1	-	4
Popular articles	7	7	10	1	2	1	28
Professional reports	1	-	2	2	1	1	7
Media articles	6	1	5	-	1	-	13
Photo exhibitions	-	2	-	-	-	-	2
Total	32	22	38	23	18	16	149

Conferences and presentations

PCU staff and students participated in and presented their work at 166 local, national and international workshops and conferences over the reporting period (Table 5). Nearly all this activity ceased in 2020 due to the restrictions on travel and mass gatherings. The workshops and capacity building activities have been especially useful in providing our students with the necessary skills to complete their analyses.

Table 5: The number of local, national, and international workshops and conferences in which PCU staff and students attended and presented their work over the reporting period.

Degree	2016	2017	2018	2019	2020	Total
Workshops & capacity building training courses	7	2	20	6	1	36
International conferences & workshops	8	9	10	11	-	38
National conferences, workshops & webinars	22	19	20	10	4	75
Local conferences, symposia & workshops	5	6	8	-	-	17
Total	42	36	58	27	5	166



PCU researchers and associates presented at the Arid Zone Ecology Forum in Prince Albert (left), and with Professor Peter Gell on an outing to Kirstenbosch Botanical Garden, following the Society for Ecological Restoration Conference, Cape Town (right).

Achievements and awards

Hoffman and Gillson have both improved on their 2015 h-index and NRF ratings (Table 6). Gillson's jump in NRF rating from B3 to B1 is especially noteworthy and reflects her increasingly influential international profile in the field of palaeoecology and conservation management.

Table 6: The change in commonly used metrics of scientific productivity and impact for Hoffman and Gillson over the reporting period.

	h-index		Citations		NRF Rating	
	2015	2021	2015	2021	2015	2021
Hoffman						
Web of Science	25	31	1769	3072	B3	B2
Google Scholar	-	46	3882	6495		
Gillson						
Web of Science	18	23	881	1766	B3	B1
Google Scholar	-	32	1886	3466		

Other notable achievements for Gillson are her receipt of the Vice Chancellor’s Future Leaders Award in 2019 and her promotion to full Professor at the start of 2021.

Hoffman was awarded WWF-SA’s Living Plant Award in 2020 for his contributions to the conservation of the Succulent Karoo and his role on the Leslie Hill Succulent Karoo Trust. He was also awarded the SAAB Silver Medal in 2021 in recognition for his contribution to the field of Botany in South Africa. He was also made a Fellow of the Royal Society of South Africa in 2021.

The success of the past 5 years can be attributed to our vibrant research team, extensive and stimulating collaboration, inspiration from stakeholders. The synergy between the repeat photography and palaeoecology methods is a major strength and perhaps a unique niche that that PCU has filled. Gillson and Hoffman benefit from and are deeply appreciative of the shared teaching load (50% each) which frees time to invest in the Unit. In the past 5 years we have benefitted from excellent funding from a number of sources, in addition to the ring-fenced income from the Leslie Hill endowment used to pay research support staff and infrastructural expenses.

Funding received

Over the review period, Gillson made successful applications for funding to the NRF Competitive Programme for Rated Researchers, African Origins Platform, Global Change Grand Challenge (SASSCAL), SANORD (Southern African Nordic Centre) and UCT’s Visiting Scholar’s Fund. These applications brought in over R 12 million in research funding and have been used to fund postgraduate and postdoctoral research as well as to upgrade facilities in the palaeoecology laboratory and to host international visitors.

Hoffman has relied on the Leslie Hill endowment fund to support the efforts of the historical ecology group as well as a few successful applications to UCT’s Humanitec project which supported the digitisation of the historical photo collection.

A summary of funding received by Gillson and Hoffman is provided in Appendix 2. A breakdown of the expenses incurred is given in the section below entitled Finances.

Challenges during the review period

COVID-19-related lockdown and travel restrictions were a considerable blow to the research programme with 3 international students unable to reach South Africa in 2020 and another stranded in the UK for 8 months. Field and laboratory work were delayed, and workshops and conferences were cancelled or postponed.

Despite our best attempts to cultivate a nurturing environment, after return to research in 2020 we sadly had to deal with allegations of bullying by one of the PDRAs. Due process was followed, and the experience was used to improve collegiality for example by the development of the code of conduct. The postdoc concerned was moved out of the Unit.

In April 2021, the PCU was destroyed by fire. The offices, tearoom, computer room were completely destroyed along with Hoffman’s cameras, scanners, archives and photograph collections. We are making arrangements to continue laboratory work in other departments and have been allocated temporary space for offices and microscope work in the John Day Building.

FUTURE PLANS

Overview: Engagement with UCT Vision 2030

We have tried to align our strategic vision for the future with UCTs Vision 2030 (Figure 3) and elaborate on each step below.

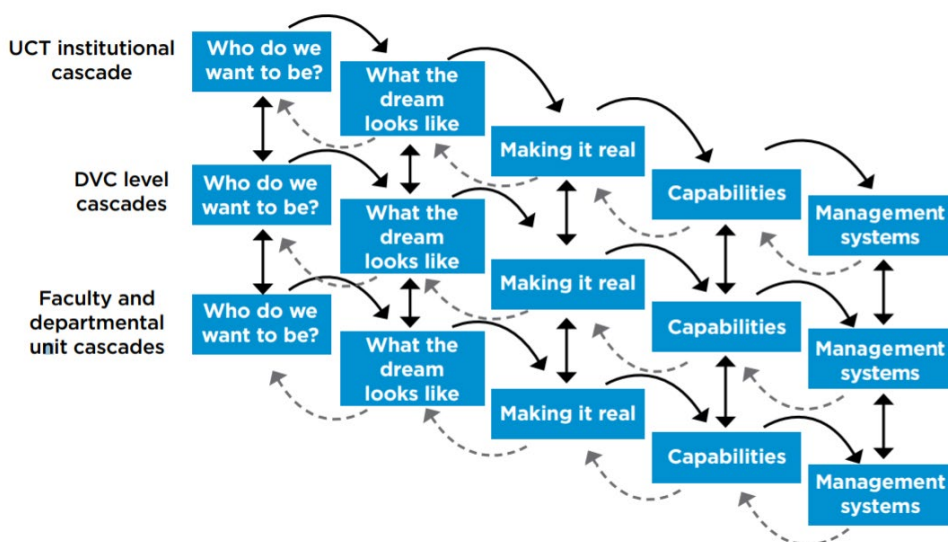


Figure 3: Cascades of choice from Roger Martin’s *Playing to Win* adapted for UCT in the VC’s Vision 2030.

Who do we want to be?

We would like to be a group that unleashes the potential of our students to become future leaders in the fair, just and sustainable conservation of biodiversity and the sustainable management of ecosystems and landscapes in Africa and beyond.

What the dream looks like

To contribute to the understanding of African social-ecological systems and to help to solve complex problems of environmental change, biodiversity conservation and sustainability.

Making it real

To do this, we will:

- build on our expertise of the winter rainfall region, biology, historical ecology and palaeoecology and capitalise on our location in one of the most biodiverse areas of the world.
- tailor our research agenda to meet the needs of South Africa biodiversity conservation while retaining international and global relevance.
- address the complex problems of today and tomorrow through a past-present-future perspective, interdisciplinary collaboration and stakeholder engagement.
- use our research to inform relevant, African orientated undergraduate and postgraduate teaching that is delivered in an environment of mutual respect and co-learning.

Capabilities

- The PCU aims to attract students with exceptional potential, especially female scientists and those from Africa.
- We will offer research and training opportunities in a transformative, inclusive and socially engaged environment.
- We aim for continuous improvement of training, facilities and leadership.
- We aim to equip our graduates with the skills and confidence to be competitive in the academic and conservation sectors and to contribute to conservation, environmental change and sustainability.
- We strive for continuous improvement, upskilling and outreach through growing collaborations, networks and engagement.
- We will listen to and learn from our postgraduate community in shaping the PCU's research agenda and culture.

Infrastructure rebuild

The fire at UCT and rebuilding of the PCU provides opportunities to push for enhanced environmental standards in our building and to engage with management on greening of building, management of vegetation on campus, and management of fire on Table Mountain.

Regarding the building, we would like energy efficient cooling and heating, ideally powered by photovoltaics, which would also improve resilience to load shedding. We would like to reconfigure the large boardroom into a more versatile meeting and social space, a field store, and if possible, a small outdoor roof garden / balcony.

We will engage with user groups so that these ambitions can be reconciled with heritage concerns and budgetary constraints.

Research plans

Hoffman will consolidate his research efforts over the remaining 2½ years of his employment at UCT. The destruction of his archive and associated materials has been a major blow for the activities that he had formulated for this period. It is still too early to have a coherent plan for the time that remains. There will be a focus on the digital archive and on rePhotoSA, the citizen science repeat photography project, but the details of these efforts are uncertain at this stage.



Repeat photo pairs near Nelspruit take by Pole Evans in 1920 (left) and James Puttick in 2021 (right).

Gillson will continue to build on the cohesive structure provided by the three focal areas, Cape Floristic Region (winter rainfall region), savannas (including Namibia) and Madagascar. The past-present-future perspective will continue to underpin the research, as well as the interdisciplinary perspective provided by the focus on landscapes and social-ecological resilience. There will be a growing emphasis on scenario planning and modelling. As palaeoecological data sets emerge and modelling skills build during the current suite of projects, the emphasis on management implications, and stakeholder applications will become increasingly important. Specifically, restoration ecology and sustainability will become increasingly important themes. Gillson has submitted grant applications for the Competitive Fund for Rated Researchers which embeds palaeoecology and other long-term data into the EFTEON landscapes, extending the temporal scale of these important interdisciplinary focal areas. She has also submitted a proposal to African Origins Platform that positions the palaeoecological and modelling interface in relation to ecosystem services and the Sustainable Development Goals. If successful, these grants will fund a suite of Postdoctoral and Postgraduate projects from 2022-2024. Continued training in modelling and quantitative methods will be emphasised, for example through rescheduling of Alistair Seddon's training visit on EcoRe3. Her goal is continued improvement of NRF rating, specifically through innovations at the interface between palaeoecology and modelling and in improved international presence.



Lindsey Gillson, coring in Bwabwata National Park, Namibia (left) and with Yolanda Chirango and Cherie Dirk at Grootbos Private Nature Reserve (right).

We will continue to work towards an inclusive and diverse environment that nurtures the talents, capacity and confidence of young scientists, especially those from Africa and women scientists. We will empower and encourage agency in our ECRs and staff who will contribute not only to the scientific endeavour and academic project of excellence at UCT but also through engagement with and assistance to our stakeholders.

With regards to management, leadership and inclusivity, Gillson aims to continue upskilling over the coming years. She has recently implemented a practice of setting SMART (specific, measurable, attainable, realistic and time-constrained) deliverables for postgrad and postdoctoral researchers, which provides a more structured approach to monitoring student progress. Management and leadership skills, inclusivity and diversity, unconscious bias and student mental health are all areas where she plans to pay attention to and where possible attend training.

Governance: Succession planning

Hoffman will retire at the end of 2023. In the time that remains he plans to complete the digitisation of the remaining and any new historical photograph collections and secure rePhotoSA in perpetuity by embedding curatorship of this collection within an appropriate institution such as the South African Environmental Observation Network (SAEON). He also plans to improve the online interface of rePhotoSA for engagement with citizen scientists. The synergy between repeat photography and palaeoecology is to our knowledge unique, and the hypotheses generated from repeat photography have shaped Gillson's research programme in the winter rainfall region. Opportunities for continued collaboration between Gillson and Hoffman beyond 2023 are being explored.

Currently, Hoffman holds the Leslie Hill Chair of Plant Conservation and is also the Director of the Plant Conservation Unit. The two positions are not necessarily connected, and the plan is to build the unit into a

larger more integrated, interdisciplinary research grouping under the leadership of Gillson. Ideas for how best to support this expanded vision are currently being explored within the Department of Biological Sciences as well as with the Development and Alumni Department.

In terms of the Leslie Hill Chair of Plant Conservation the succession plan is that Gillson will apply for the position when Hoffman retires in 2023. Therefore, Gillson and Hoffman are working together to ensure that her skills and research programmes, as outlined in her 5-year plan, are aligned with the requirements of the Chair. In terms of the endowment, the Leslie Hill Chair is required to focus research on the Winter Rainfall Region and to act as a trustee to the Leslie Hill Succulent Karoo Trust *Ex Officio*. Hoffman and Gillson are co-authoring a book chapter on succulent karoo conservation to develop Gillson's capacity in this regard. Several co-authored publications are planned in the next few years based on current MSc, PhD and Postdoctoral Projects. We are also co-leading a Fynbos reading group to define key research questions and write synthesis and review papers.

Gillson will continue the expansion of integrated winter rainfall projects in line with criteria for the Leslie Hill Chair. This will build on the momentum of pilot projects currently in place, expanding into bigger research projects that position our work relative to national and international frameworks. Specifically, recently submitted research proposals will align Gillson's work with the Expanded Terrestrial Expanded Freshwater and Terrestrial Environmental Observation Network (EFTEON) and the Sustainable Development Goals (SDGs). In the longer term she is interested in expanding the interdisciplinary focus of the PCU, possibly with the aim of expanding the Unit back into an Institute with a wider focus on landscape change over time.

Whether or not Gillson is successful in her application, there will be a new staff member based at the PCU within the next 5 years. To complement existing expertise on long-term change and to enhance the past-present future perspective, it would be strategic if this person could have modelling and / or GIS skills, as well as expertise on the botany and ecology of the Winter Rainfall Region.

We can also enhance academic capacity through closer collaboration with colleagues in the department and beyond, as well as expansion of HRA network. In this regard, the recent recruitment of Dr Jasper Slingsby represents a promising opportunity as his expertise is an ideal fit with the unit. He is part of the EFTEON proposal submitted by Gillson and we hope he will become an active member of PCU activities, strategy and research direction. Some of the current staff could be approached to be formally co-opted as members of the PCU (as has been done in IC-Wild), or informally through co-supervision of students and/ or as part of strategic governance. A first step towards this is the instigation of biannual PCU research symposia that seek to showcase our research and embed it within broader research contexts, for example the synergies with ecophysiologicals and GIS experts could be strengthened by this exposure. In addition, we plan to submit a proposal to host a Junior Research Fellow with skills that complement the existing team (e.g. modelling, GIS and / or quantitative skills).

Interdisciplinarity could be improved through greater engagement with archaeology (e.g. Shadreck Chirikure, Anneli Ekblom) and the Humanities Programme for the Environment (e.g. Hedley Twidle, Lesley Green), Rachel Wynberg at EGS, ACDI (Mark New, Sheona Shackleton) and Vernon Visser (SEEC). Our HRAs Rick Rhode, Helga van der Merwe and Peter Carrick contribute valuable insights and productivity to the team, as well as an interface with user groups such as SAEON. This network could be expanded to include more modelling collaborators (e.g. Matthew Forrest, Senkenberg Institute on DGVMs), Jai Clifford-Holmes (System Dynamics Modelling), Alistair Seddon (quantitative palaeoecology).

In regard to stakeholder engagement, we plan to seek greater interaction with SANParks (e.g. Nicola van Wilgen) and Cape Nature (e.g. Andrew Turner) as results from the current projects emerge. Planned projects will lead to greater integration with SAEON (e.g Glenn Moncrieff) and EFTEON.

We acknowledge that any plans made will need to develop in accordance with Department and Faculty staffing and budgetary requirements and limits.



Tsilavo Razafimanantsoa (centre) and his team, collecting sediment cores in the Central Highlands of Madagascar.

FINANCES

Income & expenditure for the period under review: 2016-2020

		Actuals for period under review					
		2016	2017	2018	2019	2020	Σ2016-2020
Opening Balance (at the beginning of each period)		7,606,188	7,851,869	7,372,914	7,151,363	9,986,114	7,606,188
Income: Total		2,499,898	2,364,379	2,148,816	7,367,675	5,192,475	19,573,242
UCT Total		2,209,898	1,917,337	2,196,777	2,737,075	2,607,065	11,668,151
URC		70,655	33,294	145,367	80,866	50,822	381,004
UCT (VC 2020, URC, Other)		350,000			500,000	380,000	1,230,000
PCU Vehicle Recoveries (Mileage)		-	26,469	66,645	38,436		131,549.42
Investment income: e.g. portfolio 3. 2.1		1,789,243	1,857,574	1,984,765	2,050,698	2,097,094	9,779,373
Miscellaneous - if truly small and varied					67,075	79,149	146,224
EXTERNAL (LOCAL) Total		290,000	447,042	47,961	4,630,600	2,585,410	7,905,091
Major funder/source 1. Example: NRF		80,000	82,342	30,000	4,481,000	2,585,410	7,258,752
Major funder/source 2. Examples: DTI/DAFF							-
Major funder/source 3. CSIR		180,000	180,000	86,998			273,002
Major funder/source etc. Examples: SAN,SANC&SANBI		30,000	4,000	1,000	60,000		95,000
Miscellaneous - if truly small and varied			180,700	8,037	89,600		278,337
EXTERNAL (FOREIGN) Total		-	-	-	-	-	-
Major funder/source 11. Examples: BMGF, NIH, US universities							-
Major funder/source 12. Examples: DFID, Wellcome Trust, UK universities							-
Major funder/source 13. Examples: EU/EC/IDRC/EurGovt&Univ							-
Major funder/source etc. Examples: Celgene/Merck/UN/WHO/WorldBnk							-
Miscellaneous - if truly small and varied							-
Expenditure: Total		2,254,216	2,843,334	2,370,368	4,532,923	4,843,694	16,844,534.52
Staffing		1,690,990	1,623,353	1,737,872	1,693,746	2,188,718	8,934,679
Bursaries		26,520	193,850	60,000	395,000	727,485	1,402,855
Postdoc Bursaries and Running costs					880,000	940,000	1,820,000
Subcontracting/Consultants		31,055	47,680	46,000	85,013	52,917	262,664
Consortium Payments/Transfers			50,000	150,000			200,000
Equipment: IT, others		115,298	33,883	24,669	650,007	562,311	1,386,168
Workshops, Meetings, Conferences		25,943	30,195	34,357	52,525	50,852	193,872
Travel Costs		112,077	114,601	108,550	234,062	60,629	629,919
Fieldwork		76,123	68,361	10,861	55,584	6,828	217,757
Lab Materials/Consumables		62,905	51,926	89,863	364,097	150,680	719,471
Vehicle - Fuel and Maintenance		9,757	31,492	71,015	64,969	33,463	210,695
Publication Fees				16,310	8,440	41,353	66,104
Books and Journals		42,350	4,726	616	4,849	3,050	55,591
Cost Recovery		14,346	14,346	14,346	9,000		23,346
Vehicle - New Purchase			538,785				538,785
Other Expenses		46,852	40,136	34,601	35,631	25,409	182,629
Closing Balance = Opening Balance + Income - Expenditure		7,851,869	7,372,914	7,151,363	9,986,114	10,334,895	10,334,895
Investment reserves - balance at end of final year of review.							4,538,789

Forecasted income & expenditure for the period 2021-2025

	2021			2022		
	Committed	Forecast	Total	Committed	Forecast	Total
Opening Balance (at the beginning of each period)	10,334,895		10,334,895	11,462,091.63	352,403	11,109,689
Income:						
Total	2,802,921	2,430,978	5,233,899	-	6,315,717	6,315,717
UCT						
Total	375,564	2,430,978	2,806,542	-	2,928,217	2,928,217
URC	50,000		50,000			-
UCT (VC 2020, URC, Other)	325,564		325,564	660,000		660,000
PCU Vehicle Recoveries (Mileage)			-			-
<u>Investment income: e.g. portfolio 3, 2.1</u>		2,430,978	2,430,978	2,268,217		2,268,217
Miscellaneous - if truly small and varied			-			-
EXTERNAL (LOCAL)						
Total	2,427,357	-	2,427,357	-	3,387,500	3,387,500
Major funder/source 1. Example: NRF	2,403,918		2,403,918	3,387,500		3,387,500
Major funder/source 2. Examples: DWA/DOH/DST/DTI/DAFF/Presidency			-			-
Major funder/source 3. CSIR			-			-
Major funder/source etc. Examples: SAN,SANC&SANBI	21,739		21,739			-
Miscellaneous - if truly small and varied	1,700		1,700			-
EXTERNAL (FOREIGN)						
Total	-	-	-	-	-	-
Major funder/source 11. Examples: BMGF, NIH, US universities			-			-
Major funder/source 12. Examples: DFID, Wellcome Trust, UKRI, UK universities			-			-
Major funder/source 13. Examples: EU/EC/IDRC/EurGovt&Univ			-			-
Major funder/source etc. Examples: Celgene/Merck/UN/WHO/WorldBnk			-			-
Miscellaneous - if truly small and varied			-			-
Expenditure:						
Total	1,675,724	2,783,381	4,459,105	-	4,215,035	4,215,035
Staffing	289,559	2,188,381	2,477,940		2,018,035	2,018,035
Bursaries	719,811	30,000	749,811		395,000	395,000
Postdoc Bursaries and Running costs	330,000	120,000	450,000		1,500,000	1,500,000
Subcontracting/Consultants	25,000	50,000	75,000		50,000	50,000
Consortium Payments/Transfers			-			-
Equipment: IT, others	6,999	200,000	206,999		50,000	50,000
Workshops, Meetings, Conferences		60,000	60,000		50,000	50,000
Travel Costs	35,948	20,000	55,948		25,000	25,000
Fieldwork	19,285	50,000	69,285		55,000	55,000
Lab Materials/Consumables	239,364	15,000	254,364		17,000	17,000
Vehicle - Fuel and Maintenance	9,759	50,000	59,759		55,000	55,000
Publication Fees						
Books and Journals						
Cost Recovery	3,261					
Vehicle - New Purchase						
Other Expenses	9,137					
Closing Balance = Opening Balance+Income-Expenditure	11,462,092	352,403	11,109,689	11,462,091.63	1,748,279	13,210,371

	2023			2024		
	Committed	Forecast	Total	Committed	Forecast	Total
Opening Balance (at the beginning of each period)	11,462,091.63	1,748,279	13,210,371	11,462,091.63	4,836,968	16,299,060
Income:						
Total	-	6,761,445	6,761,445	-	3,580,803	3,580,803
UCT						
Total	-	2,838,945	2,838,945	-	2,453,303	2,453,303
URC			-			-
UCT (VC 2020, URC, Other)		480,000	480,000			-
PCU Vehicle Recoveries (Mileage)			-			-
Investment income: e.g. portfolio 3. 2.1		2,358,945	2,358,945		2,453,303	2,453,303
Miscellaneous - if truly small and varied			-			-
EXTERNAL (LOCAL)						
Total	-	3,922,500	3,922,500	-	1,127,500	1,127,500
Major funder/source 1. Example: NRF		3,922,500	3,922,500		1,127,500	1,127,500
Major funder/source 2. Examples: DWA/DOH/DST/DTI/DAFF/Presidency			-			-
Major funder/source 3. CSIR			-			-
Major funder/source etc. Examples: SAN,SANC&SANBI			-			-
Miscellaneous - if truly small and varied			-			-
EXTERNAL (FOREIGN)						
Total	-	-	-	-	-	-
Major funder/source 11. Examples: BMGF, NIH, US universities			-			-
Major funder/source 12. Examples: DFID, Wellcome Trust, UKRI, UK universities			-			-
Major funder/source 13. Examples: EU/EC/IDRC/EurGovt&Univ			-			-
Major funder/source etc. Examples: Celgene/Merck/UN/WHO/WorldBnk			-			-
Miscellaneous - if truly small and varied			-			-
Expenditure:						
Total	-	3,672,756	3,672,756	-	-	-
Staffing		2,072,756	2,072,756			-
Bursaries		180,000	180,000			-
Postdoc Bursaries and Running costs		1,200,000	1,200,000			-
Subcontracting/Consultants		-	-			-
Consortium Payments/Transfers			-			-
Equipment: IT, others		-	-			-
Workshops, Meetings, Conferences		50,000	50,000			-
Travel Costs		30,000	30,000			-
Fieldwork		60,000	60,000			-
Lab Materials/Consumables		20,000	20,000			-
Vehicle - Fuel and Maintenance		60,000	60,000			-
Publication Fees			-			-
Books and Journals			-			-
Cost Recovery			-			-
Vehicle - New Purchase			-			-
Other Expenses			-			-
Closing Balance = Opening Balance+Income- Expenditure	11,462,091.63	4,836,968	16,299,060	11,462,091.63	8,417,771	19,879,863

	2025			Σ2021 - 2025		
	Committed	Forecast	Total	Committed	Forecast	Total
Opening Balance (at the beginning of each period)	11,462,091.63	8,417,771	19,879,863	10,334,895	-	10,334,895
Income:						
Total	-	2,551,435	2,551,435	2,802,921	21,640,378	24,443,299
UCT						
Total	-	2,551,435	2,551,435	375,564	13,202,878	13,578,442
URC			-	50,000	-	50,000
UCT (VC 2020, URC, Other)			-	325,564	1,140,000	1,465,564
PCU Vehicle Recoveries (Mileage)			-	-	-	-
<u>Investment income: e.g. portfolio 3. 2.1</u>		2,551,435	2,551,435	-	12,062,878	12,062,878
Miscellaneous - if truly small and varied			-	-	-	-
EXTERNAL (LOCAL)						
Total	-	-	-	2,427,357	8,437,500	10,864,857
Major funder/source 1. Example: NRF Major funder/source 2. Examples: DWA/DOH/DST/DTI/DAFF/Presidency			-	2,403,918	8,437,500	10,841,418
Major funder/source 3. CSIR			-	-	-	-
Major funder/source etc. Examples: SAN,SANC&SANBI			-	21,739	-	21,739
Miscellaneous - if truly small and varied			-	1,700	-	1,700
EXTERNAL (FOREIGN)						
Total	-	-	-	-	-	-
Major funder/source 11. Examples: BMGF, NIH, US universities			-	-	-	-
Major funder/source 12. Examples: DFID, Wellcome Trust, UKRI, UK universities			-	-	-	-
Major funder/source 13. Examples: EU/EC/IDRC/EurGovt&Univ			-	-	-	-
Major funder/source etc. Examples: Celgene/Merck/UN/WHO/WorldBnk			-	-	-	-
Miscellaneous - if truly small and varied			-	-	-	-
Expenditure:						
Total	-	-	-	1,675,724	10,671,172	12,346,896
Staffing			-	289,559	6,279,172	6,568,731
Bursaries			-	719,811	605,000	1,324,811
Postdoc Bursaries and Running costs			-	330,000	2,820,000	3,150,000
Subcontracting/Consultants			-	25,000	100,000	125,000
Consortium Payments/Transfers			-	-	-	-
Equipment: IT, others			-	6,999	250,000	256,999
Workshops, Meetings, Conferences			-	-	160,000	160,000
Travel Costs			-	35,948	75,000	110,948
Fieldwork			-	19,285	165,000	184,285
Lab Materials/Consumables			-	239,364	52,000	291,364
Vehicle - Fuel and Maintenance			-	9,759	165,000	174,759
Publication Fees			-			
Books and Journals			-			
Cost Recovery			-			
Vehicle - New Purchase			-			
Other Expenses			-			
Closing Balance = Opening Balance+Income-Expenditure	11,462,091.63	10,969,206	22,431,298	11,462,092	10,969,206	22,431,298

APPENDICES

Appendix 1: List of staff and students

Permanent and contract staff, visitors on extended stay, and Honorary Research Associates

Name	Position/Affiliation	Period
Permanent Staff		
Timm Hoffman	Director	2001-present
Lindsey Gillson	Deputy-Director	2006-present
Contract Staff		
Fiona Impson	Junior Research Officer	2014-present
Cariena Kleinjan	Junior Research Officer	2014-present
Sam Jack	Research Assistant	2013-2017
Samantha Venter	Research Assistant	2016-2018
Yolanda Chirango	Research Assistant	2016
Johanna Lot	Research Assistant	2014-present
Hana Petersen	Research Assistant	2019-present
Sonto Mtolo	Research Assistant (+NRF Intern-2018)	2019-present
Sally Mashele	Research Assistant	2020-present
Kim Daniels	NRF Intern	2019
Emeritus Professors, sabbatical visitors and Honorary Research Associates		
John Hoffmann	Emeritus A/Prof	2014-present
Joe McAuliffe	Desert Botanical Garden, Phoenix (visitor)	2016
Peter Carrick	HRA: Nurture, Restore, Innovate (NPO)	2010-present
Rick Rohde	HRA: Edinburgh University	2001-present
Simon Todd	HRA: SAEON	2012-2016
Helga van der Merwe	HRA: SAEON	2014-present
Anneli Ekblom	Uppsala University	2018

Current post-graduate students and postdocs

Name	Degree	Research Topic	Graduation Date (expected)
Wesley Bell	Postdoc	Bioregional land degradation assessment of the Succulent Karoo for practical application	2022
Glynis Humphrey	Postdoc	Fire, Climate and Land-use as drivers of vegetation change in Bwabwata National Park, Namibia	2019-2021
Adele Julier	Postdoc	Investigating long-term dynamics of vegetation, fire and climate in Bwabwata National Park using palaeoecology	2019-2022
Sabine Prader	Postdoc	A palaeoecological approach to the dynamics of the fynbos-forest boundary	2020-2021
Estelle Razanatsoa	Postdoc	Climate, Fire and Land-use as drivers of vegetation change in Madagascar	2019-2021
Gina Arena	PhD	Expanding grasslands? Structural biome shifts in the dryland rangelands of the eastern Karoo	(2021)
Carina Becker	PhD	Restoration of renosterveld and Succulent Karoo vegetation in the Kamiesberg	(2021)
Yolanda Chirango	PhD	A palaeoecological context for forest distribution and restoration in Grootbos Nature Reserve	(2024)
Cherie Forbes (Dirk)	PhD	A long-term palaeoecological perspective on natural resource management in the Groot Winterhoek Wilderness Area	(2021)
Kirsti Nghidinwa	PhD	Population ecology and extinction risk of <i>Pachypodium namaquanum</i>	(2023)
Glory Oden	PhD	A palaeoecological approach to the dynamics of the fynbos-forest boundary	(2024)
Zoe Poulsen	PhD	Impacts of livestock grazing and assessing rangeland restoration potential in Overberg Renosterveld	(2021)
Andriantsilavo Razafimanantsoa	PhD	Climate change and ecosystem dynamics in the Central Highlands of Madagascar	(2021)

Stephni van der Merwe	PhD	Classification and dynamics of vegetation on Marion Island	(2023)
Tim Kirsten	MSc	Mapping land degradation in the Little Karoo	(2022)
Fetra Randriatsara	MSc (planned upgrade to PhD)	Palaeoecology of the Western Dry Forests of Madagascar	(2023)
Janine Steytler	MSc	Diatoms as indicators of changing climate and water quality in the Cape Floristic Region	(2022)
Jonathan Plaistowe	MSc (Minor dissertation)	An assessment of critical carbon and water services in South Africa's National Parks	(2021)

Past students and postdoctoral researchers (2015 – 2021)

Name	Degree	Research Topic	Graduation Date
Desale Okubamichael	Postdoc	Historical repeat photography of cycad populations and vegetation change	2014-2016
Saul Manzano Rodriguez	Postdoc	Vegetation dynamics at the Fynbos-Succulent Karoo – Renosterveld Ecotone	2019-2020
Abraham Dabengwa	PhD	Long-term Ecosystem Dynamics of Contrasting Grasslands in South Africa	2019
Glynis Humphrey	PhD	Social, Ecological and Historical Determinants of Fire Management in NE Namibia	2018
James MacPherson	PhD	Ecological Resilience at Semi-arid and Temperate Ecotones of the Mediterranean-type Fynbos Biome, South Africa, in the Holocene	2017
Estelle Razanatsoa	PhD	Impact of human land-use and rainfall variability in tropical dry forests of southwest Madagascar during the late Holocene	2019
Petra Holden	PhD	A socio-ecological approach to understanding the long-term impact of mountain conservation	2018

Witness Kozanayi	PhD	Influences of governance on the sustainable use of baobab in Zimbabwe	2018
Wesley Bell	PhD	Mapping desertification: Towards an approach for mapping regional land degradation in drylands	2020
Justin van Blerk	PhD	The effect of altered rainfall seasonality on post-fire recovery of fynbos and renosterveld shrulands	2021
Kim Konings	MSc	Life history traits of South African cycads: Implications for population structure & conservation action	2016
Liesl Eichenberger	MSc	Impact of indigenous ungulate herbivory on the vegetation of Sanbona (2004-2015)	2017
Hana Petersen	MSc	Patterns of plant species richness and diversity across two habitat types in the Upper Karoo	2018
Conor Eastment	MSc (Minor dissertation)	Using repeat photography to assess changes in woody vegetation cover in Bwabwata National Park, Namibia	2020
Amy Hoffenberg	MSc (Minor dissertation)	Diatoms as indicators of Water Quality and Climate Change in the agricultural lowlands of the Western Cape, South Africa	2019 Distinction
Gabriela Fleury	MSc (Minor dissertation)	Environmental change in Riemvasmaak twenty years after resettlement	2016
Hermenegildo Matimele	MSc (Minor dissertation)	An assessment of the distribution and conservation status of endemic species in Maputaland	2016
Wataru Tokura	MSc (Minor dissertation)	Changes in plant productivity using EVI satellite data in Tswalu Kalahari Reserve	2016
Elelwani Nenzhelele	MSc (Minor dissertation)	Long-term impacts of livestock grazing in the Succulent Karoo: A 20-year study in Namaqualand	2017
Olli Hyvarinen	MSc (Minor dissertation)	Long-term vegetation change after converting to game ranching in Asante Sana Game Reserve	2018

Luke Wilson	MSc (Minor dissertation)	Elephant impacts on woody vegetation around artificial waterholes in Zambezi National Park, Zimbabwe	2020
Caitlyn Callanan	Hons	Reconstructing changes in herbivory in the Mahafaly Plateau, Madagascar	2019
Caitlin Dixon	Hons	Stable isotopes and lithology as indicators of vegetation change in the Bwabwata National Park, Namibia	2019
Rio Button	Hons	Climate and indigenous people's influence on the landscape of the West Coast in the late Holocene	2016
Kim Daniels	Hons	Vegetation change in the Cape Flats Nature Reserve over the last 40 years using repeat photography	2020
Ruan de Wet	Hons	Change in the semi-arid savanna vegetation of Sabi Sand Wildtuin (2003-2016)	2016
Sally Mashele	Hons	Application of GIS tools in the fire event analysis of Jonkershoek Nature Reserve	2017
Kakale Munamati	Hons	Long-term changes in Sand Forest vegetation of Maputaland KZN from 2005-2015 using MODIS	2016
Tara van Ryneveld	Hons	Assessing the role of disease, drought and fire-induced canopy dieback in the Clanwilliam Cedar.	2017
Nina Zizzamia	Hons	A repeat photography analysis of the forest-fynbos ecotone in Swartboschkloof, Jonkershoek (1935-2017)	2017

Appendix 2: Grants and funding received

Source	Amount	Project Title	Purpose	Date
Vice Chancellor's Future Leader's Fund	c.R1.5million	Long-term changes in biodiversity and ecosystem services in African ecosystems	Student support, PI funding, running costs and travel	2019-2023
NRF Competitive for Rated Researchers	R2.9 million	Palaeoecology, Ecosystem Services and Future Scenarios	Studying long-term change in vegetation and ecosystem services. Implications for biodiversity conservation and management of biodiverse landscapes	2019-2021
African Origins Platform	R3.4million	Palaeoecology, Ecosystem Services and Sustainable Future Scenarios	Studying long-term change in vegetation and ecosystem services. Implications for biodiversity conservation and sustainable use of ecosystem services	2019-2021
Global Change Grand Challenge SASSCAL	R3.0million	Palaeoecology, Landscape History and Biodiversity Conservation	Studying long-term change in vegetation and ecosystem services. Implications for biodiversity conservation	2019-2021
University of Cape Town Visiting Scholar's Fund	R25000	Biocultural heritage and interactive learning – a collaboration	Visit of A/Prof Anneli Ekblom, Uppsala University, Sweden for purposes of teaching development and research	2019

SANORD	R60 000	Building capacity in quantitative palaeoecology	Visit of Dr Richard Telford and Dr Alistair Seddon for training in quantitative methods in palaeoecology	2019-2020
University of Cape Town Research Fund	R440000	Fire, climate and land-use as drivers of vegetation change in Madagascar	Postdoctoral Research Fellowship and Running Costs	2019-2020
SASSCAL	R720 000	A long-term, palaeoecological perspective on natural resource management in response to climate and socio-economic drivers for Ecosystem-based Adaptation.	Funding for PhD bursary and running costs (Cherie Forbes)	2016 – 2020
HUMANITEC	R100 000	Digital scanning of historical photographs	Carnegie Institute (via UCT Libraries)	2015-2017
SANBI	R700 000	Long-term change in South African cycads	Postdoctoral Research Fellowship and Running Costs	2014-2016
WWF-SA	R270 000	Mapping land degradation in the Succulent Karoo biome	Postdoctoral Research Fellowship and Running Costs	2020-2021

Appendix 3: List of publications

Publications of the staff, students, and research associates of the Plant Conservation Unit for the period 2016-2020

(i) Book

1. Rohde R and O'Connell S 2016. Hanging on a Wire: Photographs by Sophia Klaase. Fourthwall Books. ISBN 978-0-9922404-3-1. (Radio interview: <http://iono.fm/e/383942>.)

(ii) Journal articles

2. Arena G, van der Merwe H, Todd SW, Pauw MJ, Milton SJ, Dean WRJ, Henschel JR 2018. Reflections, applications and future directions of Long-Term Ecological Research at Tierberg. *African Journal of Range & Forage Science* 35: 257-265. DOI: <https://doi.org/10.2989/10220119.2018.1513072>
3. Balvanera P, Calderon-Contreras R, Castro AJ, Felipe-Lucia MR, Geijzendorffer IR, Jacobs S, Martin-Lopez B, Arbieu U, Speranza CI, Locatelli B, Harguindeguy NP, Mercado IR, Spierenburg MJ, Vallet A, Lynes L and Gillson L 2017. Interconnected place-based social–ecological research can inform global sustainability. *Current Opinion in Environmental Sustainability* 29:1–7. <https://doi.org/10.1016/j.cosust.2017.09.005>.
4. Bell W, Hoffman MT and Visser V 2021. Regional land degradation assessment for dryland environments: The Namaqualand Hardeveld bioregion of the Succulent Karoo biome as a case study. *Land Degradation & Development* 32: 2287-2302. <https://doi.org/10.1002/ldr.3900>.
5. Bourne A, Holness S, Holden P, Scorgie S, Donatti CI and Midgley G 2016. A Socio-Ecological Approach for Identifying and Contextualising Spatial Ecosystem-Based Adaptation Priorities at the Sub-National Level. *PLoS ONE* 11(5): e0155235. <https://doi.org/10.1371/journal.pone.0155235>.
6. Breman E, Ekblom A, Gillson L and Norström E 2019. Phytolith-based environmental reconstruction from an altitudinal gradient in Mpumalanga, South Africa, 10,600 BP–present. *Review of Palaeobotany and Palynology* 263:104-116. <https://doi.org/10.1016/j.revpalbo.2019.01.001>
7. Cardoso AW, Midgley JJ, Hoffman MT and Geldenhuys CJ 2017. Temperate forest dynamics and carbon storage: a 26-year case study from Orange Kloof Forest, Cape Peninsula, South Africa. *Southern Forests: A Journal of Forest Science* 79:1-7. <http://dx.doi.org/10.2989/20702620.2016.1254904>.

8. Carrick PJ and Forsythe KJ 2020. The species composition-ecosystem function relationship: A global meta-analysis using data from intact and recovering ecosystems. *PLoS ONE* 15(7): e0236550. <https://doi.org/10.1371/journal.pone.0236550>.
9. Chin A, Gillson L, Quiring SM, Nelson DR, Taylor MP, Vanacker V and Lovegrove D 2016. An evolving Anthropocene for science and society *Anthropocene* 13:1-3. <https://doi.org/10.1016/j.ancene.2016.05.002>.
10. Chin A, Cui X, Gillson L, Nelson D, Taylor MP, Vanacker V, Wang E 2020. Anthropocene in an age of pandemics. *Anthropocene* 30: 100247. <https://doi.org/10.1016/j.ancene.2020.100247>. [Editorial]
11. Cowling RM and Hoffman MT 2021. Medium term vegetation change on Holocene dunes in the south-eastern Cape Floristic Region: is thicket without fire inevitable? *South African Journal of Botany*. (In press).
12. Cramer MD, Power SC, Belev A, Gillson L, Bond WJ, Hoffman MT, Hedin L 2018. Are forest-shrubland mosaics of the Cape Floristic Region an example of alternate stable states? *Ecography* 42:1-13. <https://doi.org/10.1111/ecog.03860>.
13. Cronin K, Kaplan H, Gaertner M, Irlich U and Hoffman MT 2017. Aliens in the nursery: Assessing the attitudes of nursery managers to invasive species regulations. *Biological Invasions* 19(3): 925–937. <https://doi.org/10.1007/s10530-016-1363-3>.
14. Dabengwa AN, Gillson L, Bond WJ 2021. Resilience modes of an ancient valley grassland in South Africa indicated by palaeoenvironmental methods. *Environmental Research Letters*. <http://doi.org/10.1088/1748-9326/abdf87>.
15. Davis C, Hoffman MT and Roberts W 2017. Long-term trends in vegetation phenology over Namaqualand using GIMMS AVHRR NDVI3g dataset from 1982-2011. *South African Journal of Botany* 111: 76-85. <http://dx.doi.org/10.1016/j.sajb.2017.03.007>.
16. Davis C, Hoffman MT and Roberts W 2016. Recent trends in the climate of Namaqualand, a megadiverse arid region of South Africa. *South African Journal of Science* 112(3/4), Art. 2015-0217, 9 pages. <http://dx.doi.org/10.17159/sajs.2016/20150217>.
17. Diamond R and Jack S 2018. Evaporation and abstraction determined from stable isotopes during normal flow on the Gariep River, South Africa. *Journal of Hydrology* 559, 569-584. <https://www.sciencedirect.com/science/article/pii/S0022169418301410?via%3Dihub>.
18. Djukic I, Kepfer-Rojas S, Schmidt IK, Larsen KS, Beier C, Berg B, Verheyen K, **Arena G** et al. 2018. Early stage litter decomposition across biomes. *Science of the Total Environment* 626: 1-26. https://www.researchgate.net/publication/322739158_Early_stage_litter_decomposition_across_biomes.

19. Ekblom A, Gillson L and Notelid M 2017. Water Flow, Ecological Dynamics and Management in The Lower Limpopo Valley: A Long-Term View. *WIREs Water*. <https://doi.org/10.1002/wat.1228>.
20. Ekblom A, Shoemaker A, Gillson L, Lane P and Lindholm K-J 2019. Conservation through biocultural heritage – examples from sub-saharan Africa. *Land* 8(1): 5. <https://doi.org/10.3390/land8010005>.
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22. Forbes CJ, Gillson L and Hoffman MT 2018. Shifting baselines in a changing world: identifying management targets in endangered heathlands of the Cape Floristic Region, South Africa. *Anthropocene* 22, 81-93. <https://doi.org/10.1016/j.ancene.2018.05.001>.
23. Gillson L and Ekblom A 2020. Using palaeoecology to explore the resilience of southern African savannas. *Koedoe* 62(1) a1576. <https://doi.org/10.4102/koedoe.v62i1.1576>.
24. Gillson L, Biggs H, Smit IP, Virah-Sawmy M and Rogers K 2019. Finding common ground between adaptive management and evidence-based approaches to biodiversity conservation. *Trends in Ecology & Evolution* 34: 31-34. <https://doi.org/10.1016/j.tree.2018.10.003>.
25. Gillson L, MacPherson J and Hoffman MT 2020. Contrasting mechanisms of resilience at semi-arid and temperate boundaries of fynbos, a mega-diverse heathland of South Africa. *Ecological Complexity* 42 Article Number: 100827. <https://doi.org/10.1016/j.ecocom.2020.100827>.
26. Gillson L, Seymour CL, Slingsby JA and Inouye DW 2020. What are the Grand Challenges for Plant Conservation in the 21st Century? *Frontiers in Conservation Science* 1: Article 600943. <https://doi.org/10.3389/fcosc.2020.600943>.
27. Gillson L, Whitlock C and Humphrey G 2019. Resilience and fire management in the Anthropocene. *Ecology and Society* 24(3): 14. <https://doi.org/10.5751/ES-11022-240314>
28. Haimbili EN, Shiponeni N and Carrick PJ 2016. Testing the Suitability of Mined Soils for Native Species Establishment at Navachab Gold Mine, Namibia. *Academic Journal of Science* 6: 319–344.
29. Henschel JR, Hoffman MT, Walker C 2018. Introduction to the Karoo Special Issue: Trajectories of change in the Anthropocene. *African Journal of Range & Forage Science* 35: 151-156. <https://doi.org/10.2989/10220119.2018.1535214>.
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 33. Hoffman MT, Rohde RF, Gillson L 2019. Rethinking catastrophe? Historical trajectories and modelled future vegetation change in southern African. *Anthropocene* 25: 100189. <https://doi.org/10.1016/j.ancene.2018.12.003>.
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 43. James JJ and Carrick PJ 2016. Toward quantitative dryland restoration models. *Restoration Ecology* 24: 85–90. DOI: <https://doi.org/10.1111/rec.12393>.
 44. Jerardino A, Navarro R, Orton J, Button R, Halkett D, Webley L, Tusenius, Hoffman T and February E 2018. Late Holocene climatic and cultural variability at a focal point of settlement

- near Lamberts Bay, South Africa: test excavations at Soutpansklipheuwel. *South African Archaeological Bulletin* 73(207): 13-34.
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147. Wild S 2017. Citizen scientists' photos capture the impact of climate change on southern Africa's landscape. QUARTZ Africa, 3 June 2017. <https://qz.com/996437/the-photos-from-a-citizen-science-project-capture-southern-africas-climate-change-future/>. (Article requested by Sarah Wild from SL Venter - Online version available.)
148. Article on Stellenbosch University website about the TSEC conference, at which rePhotoSA was represented (2018): <http://www.sun.ac.za/english/Lists/news/DispForm.aspx?ID=5871>.

(vii) Photo Exhibitions

1. Rohde R and O'Connell S 2017. Curators Extra Ordinary Lives: Portraits from a divided land. Photographs by Sophia Klaase. Fisher Gallery, Otterbein University. August 21 to December 3, 2017. <http://www.otterbein.edu/public/About/Calendars/ArtScene/ArtExhibitions.aspx>.
2. Sullivan S, Rohde RF, Impey A, Hannis M and Low C 2017. Landscape, Memory and Music in West Namibia. Future Pasts: A multi-media exhibition at Gallery 44AD, 4 Abbey St. Bath, UK; 12 July - 12 August 2017.

Appendix 4: List of workshops, conferences, webinars, seminars

Workshops and presentations of the staff and students of the Plant Conservation Unit over the period 2016-2020

WORKSHOPS AND CAPACITY BUILDING

Arena G, Lot M, Mashele S, Mtolo S, van der Merwe H, Venter SL, 2018. Show me the money. Workshop hosted by Wilderness Foundation Africa and SANBI on funding application & proposal writing processes, Graham Beck Skills Centre, Robertson, 15 October 2018.

Bell W and Hoffman MT 2018. Expanding the Conservation Estate. Workshop hosted by Wilderness Foundation Africa exploring the challenges of conservation in South Africa, Graham Beck Skills Centre, Robertson, 15 October 2018.

Bell W 2018. Model-based multivariate analysis of abundance data using R. Attended the workshop at Kirstenbosch Research Centre, SANBI, Cape Town, 22–26 January 2018.

Carrick PJ 2016. Growing Our Understanding to Inform Restoration. Workshop: Renosterveld Ecosystem Function, Swellendam, South Africa, 16-18 November 2016.

Carrick PJ 2017. Namakwa Sands Workshop on Rehabilitation: Monitoring, Assessments, Targets, Metrics. Tronox Management Board Series, Saldanha, South Africa, 11 January 2017.

Dabengwa A 2016. Global Palaeofire Working Group “Fire baselines by biomes” workshop held in Beguey (France), 25-29 September 2016. Abraham was chosen to lead the Southern Africa group at this workshop.

Forbes C 2018. Introduction to Statistical Modelling and Data Analysis. Attended the workshop held at the University of Cape Town, South Africa, 18-20 July 2018.

Forbes C 2018. Western Cape Climate Change Response Forum: An initiative under Provincial Strategic Goal 4. Attended the workshop held at the Kristo Pienaar Environmental Education Centre, Tygerberg Nature Reserve, Western Cape, 27 February 2018.

Forbes C 2018. Attended Young Scholars Spring School on Social-Ecological Systems Research at Nelson Mandela University in George, South Africa, 5-10 October 2018.

Forbes C 2018. Attended a facilitation training workshop at the Sustainability Research Unit, NMU George Campus, 21 October 2018.

Forbes C 2018. Table Host (co-facilitation) for the Nature Conservation & Game Ranch Management Transformation Workshop, Nelson Mandela University, George Campus, 22 October 2018.

Forbes C 2018. Table Host (co-facilitation) for the GEF 5 Project Reflective Learning Workshop, Mountain Zebra Camdeboo Protected Environment, Graaff-Reinet, 6 November 2018.

Forbes C 2018. Attended a transdisciplinary Learning & Sharing Day Workshop as part of the African Climate & Development Institute (ACDI) Transdisciplinary Working Group, University of Cape Town, 29 November 2018.

Gillson L 2016. Biodiversity and Environmental Change in the Cape Floristic Region. Convenor of Faculty Strategic Impact Area Workshop held at the University of Cape Town, 8 February 2016.

Gillson L 2016. African Mountains Workshop. Co-organiser at World University Network (WUN) Workshop, University of Cape Town, Cape Town, June 2016.
(<http://www.pcu.uct.ac.za/news/african-mountains-research>)

Gillson L 2016. Palaeoecology, resilience, and sustainability. Session Convenor and Chair of Session at 5th International EcoSummit Congress, Montpellier, France, 29 August – 1 September 2016.

Gillson L 2017. Biodiversity and Environmental Change in the Cape Floristic Region Workshop. Organiser of the workshop in Jonkershoek Nature Reserve, Stellenbosch, South Africa, 24 January 2017.

Gillson L 2018. Introduction to Statistical Modelling and Data Analysis. Attended the workshop held at the University of Cape Town, South Africa, 18-20 July 2018.

Gillson L 2018. Participant at the workshop, 'A horizon scan for biodiversity conservation in South Africa' at SANBI, Kirstenbosch Research Centre.

Gillson L 2018. Codesigning Energy Communities. Workshop participant at the Stellenbosch Policy Seminar Programme, at STIAS, Stellenbosch University

Gillson L, MacPherson J and Hoffman MT. 2019 Using palaeoecology to explore ecosystem resilience at biome boundaries in southern Africa. Paleoscience Symposium: Paleoclimate and Paleoenvironments. Africa Center of Excellence for Water Management, Addis Ababa University, Ethiopia. 25-31 March 2019.

Gillson L 2019. R for palaeoecologists. Workshop organized for palaeoecology lab and run by Professor Richard Telford from Bergen University, Norway. University of Cape Town, Cape Town. 30 September – 4 October 2019.

Gillson L 2019. Using the past to manage the future: the role of long-term data in restoration ecology. Convened and chaired the symposium session of six invited papers which were presented at the 8th World Conference on Ecological Restoration, Cape Town, 24-28 September 2019.

Gillson L 2019. Attended the Centre for Australian Biodiversity and Heritage (CABAH) Symposium and Centre Advisory Committee meeting held at Monash University, Melbourne, Australia.
(https://epicaustralia.org.au/annual_reports/annual-report-2017/)

Gillson L 2020. PAGES (Past Global Changes) Scientific Steering Committee and PalaeoSciences Symposium ('*Using long-term data for sustainability, resilience and biodiversity conservation*') at the University of Cape Town, 24-26 March 2020. HELD ONLINE DUE TO COVID-19.

Hoffman MT 2018. Decline of Field Cultivation in Communal Areas of South Africa: Patterns, Drivers and Socio-Ecological Consequences. Attended the workshop held in Cape Town, 29 May-2 June 2018.

Hoffman MT 2019. Innovation and synergy in expanding the protected area network. One-day workshop organized by WWF. Hotel Verde, Cape Town. 30 April 2019.

Humphrey G 2018. Attended a transdisciplinary Learning & Sharing Day Workshop as part of the African Climate & Development Institute (ACDI) Transdisciplinary Working Group, University of Cape Town, 29 November 2018. Nghidinwa K 2018. Global Partnership for Plant Conservation conference. Attended the conference held at Kirstenbosch National Botanical Garden in Cape Town, South Africa, 28-30 August 2018.

Impson FAC 2018. The Why, What and How of biological control of weeds in South Africa. Informal presentation to students at Escola Superior Agraria de Coimbra, Coimbra University, September 2018.

Razafimanantsoa A 2018. African Fire History and Fire Ecology. Attended workshop held at the National Museum of Kenya, 20-22 July 2018.

Razanatsoa, E 2016. Global ecology and climate change. Summer school organised by the cluster of excellence COTE held in Bordeaux (France), 6-10 June 2016.

Razanatsoa E 2018. AMS Radiocarbon dating and iThemba LABS. Attended workshop held at the National Museum of Kenya, 19 July 2018.

Razanatsoa E. 2018. Establishing Chronologies. Attended workshop held at the National Museum of Kenya, 20-22 July 2018.

Razanatsoa E and Razafaminantsoa A 2019. Attended the 56th Annual Meeting of the Association for Tropical Biology and Conservation held in Antananarivo, Madagascar, 30th July to 3rd August 2019.

Rohde R and O'Connell S 2016. Outsider photography/insider ethnography – writing ourselves out of the picture? Contemporary Ethnography Across the Disciplines (CEAD) Ethnographic imaginings, space, place and time. University of Cape Town, Iziko Museum of South Africa, Centre for the Book. Cape Town, 15 - 18 November.

Venter SL, Venter ZS and Arena G 2018. rePhotoSA. Facilitated a repeat photography workshop at Rondebosch Common, 23 June 2018.

PRESENTATIONS

International conferences and workshops

Becker C, Carrick PJ and Hoffman MT 2019. Using patch dynamics to inform ecological restoration of semi-arid and Mediterranean type fields in Namaqualand, South Africa. Paper presented at the 8th World Conference on Ecological Restoration, Cape Town, 24-28 September 2019.

Carrick PJ 2017. Are we there yet? Using reference conditions and setting usable end targets for ecological restoration. 7th World Conference on Ecological Restoration, Iguassu, Brazil, 27 Aug-1 Sept 2017.

Carrick PJ 2019. The functional and restoration ecology of the Succulent Karoo, South Africa. Paper presented at the 8th World Conference on Ecological Restoration, Cape Town, 24-28 September 2019.

Dabengwa A 2017. The ecological relevance of local herbaceous biomass in climate and herbivore sedimentary reconstructions. Poster generated for the Young Scientists Meeting and the Open Science Meeting organized by Past Global Changes (PAGES) and the Quaternary Terrestrial Environments group (Pyrenean Institute of Ecology-CSIC) in Spain, 7-13 May 2017. [Abraham did not attend though.]

English K, Hoffmann JH, Phiri E and Lyons CL 2018. Identifying factors influencing establishment discrepancies of a bud-feeding weevil, *Dicomada rufa*: a case study from South Africa. Oral presentation at XV International Symposium on Biological Control of Weeds. Hotel Bellevue, Engelberg, Switzerland, 26-31 August 2018.

Forbes C, Gillson L and Hoffman MT 2017. A palaeoecological perspective on sustainable land-use management in the Cape Floristic Region, South Africa. Poster presentation on research at the Resilience 2017 Conference hosted by the Stockholm Resilience Centre and the Resilience Alliance, Sweden, 20 - 24 Aug 2017.

Forbes C, Gillson L and Hoffman MT 2018. A palaeoecological perspective on sustainable land-use management in the Cape Floristic Region, South Africa. Poster presentation on research at the SASSCAL Science Symposium Conference, Lusaka, Zambia, 16-20 April 2018.

Forbes C, Gillson L and Hoffman MT 2019. Using a past-present-future link to investigate changes in Ecosystem Services within the Cape Floristic Region, South Africa. Poster presented at the International Conference of the System Dynamics Society, Albuquerque, New Mexico, 21-25 July 2019.

Forbes C. 2019. Shifting baselines in the restoration ecology of Renosterveld. Paper presented at the 8th World Conference on Ecological Restoration, Cape Town, 24-28 September 2019.

Gillson L 2016. Biodiversity Conservation and Environmental Change. University of Uppsala, Sweden. Invited seminar presented to Environmental History Masters class who have Lindsey Gillson's (2015) book as set text, May 2016.

Gillson L 2016. A safe operating space for humanity? How palaeoecology can help us to plant the seeds of a good Anthropocene. Invited keynote paper presented at PAGES Regional Integration Working Group Workshop. Dynamics of socio-ecosystems on a changing Earth: sustainability or collapse? Chambéry, Savoie Mont Blanc, France, 30 May – 2 June 2016.

Gillson L 2016. Palaeo-perspectives on African mountains. World University Network (WUN) Workshop, University of Cape Town, Cape Town, June 2016.
(<http://www.pcu.uct.ac.za/news/african-mountains-research>)

Gillson L 2016. To burn or not to burn? How palaeoecology can enhance the resilience and management of fire adapted socio-ecological systems. Paper presented at 5th International EcoSummit Congress, Montpellier, France, 29 August – 1 September 2016.

Gillson L 2016. What can palaeoecology contribute to the land-sharing versus land-sparing debate? Paper presented at Central and Eastern Europe Palaeoscience Symposium, Cluj-Napoca, Romania, 23-24 May 2016.

Gillson L 2019. Restoration for resilience. Invited paper presented at the 8th World Conference on Ecological Restoration, Cape Town, 24-28 September 2019.

Hirsch H, Impson FAC, Kleinjan CA, Richardson DM and Le Roux JJ. Molecular ecology of invasive Australian silver wattle, *Acacia dealbata*, in South Africa. Oral presentation at 30th Conference of the Plant Population Biology Section of the Ecological Society of Germany, Austria and Switzerland, 18-20 May 2017.

Hoffman MT 2019. Long-term changes in the biomes of southern Africa: Implications for restoration ecology. Paper presented at the 8th World Conference on Ecological Restoration, Cape Town, 24-28 September 2019.

Humphrey, G 2016. The role of indigenous fire knowledge in Bwabwata National Park, in north-east Namibia. Research presented at the National Fire Management Workshop and Strategy Development in Windhoek, Namibia, 28-29 November 2016.

Humphrey G 2019. The role of community fire knowledge in fire management in Bwabwata National Park in north-east Namibia. Paper presented at the Fire Management Stakeholder Workshop, Antananarivo, Madagascar, 24-26 July 2019.

Impson FAC, Kleinjan CA and Hoffmann JH 2018. Suppression of seed production, a basic long-term strategy in weed biocontrol, as exemplified by a midge on *Acacia mearnsii* in South Africa. Oral presentation at XV International Symposium on Biological Control of Weeds. Hotel Bellevue, Engelberg, Switzerland, 26-31 August 2018.

Kleinjan CA 2018. Phylogenetic reasoning secures release-approval for a biocontrol agent in South Africa, thus circumventing conventional host-specificity testing. Oral presentation at XV International Symposium on Biological Control of Weeds. Hotel Bellevue, Engelberg, Switzerland, 26-31 August 2018.

MacPherson AJ, Gillson L and Hoffman MT 2017. Between and within biome resilience and resistance at the fynbos-succulent karoo ecotone, South Africa. Poster generated for the Young Scientists Meeting and the Open Science Meeting organized by Past Global Changes (PAGES) and the Quaternary Terrestrial Environments group (Pyrenean Institute of Ecology-CSIC) in Spain, 7-13 May 2017. [James did not attend though.]

Manzano S. 2019. Palaeoecology as a valuable source of information for restoration practices in globally endangered habitats: A case study from a Mediterranean seasonal wetland. Paper presented at the 8th World Conference on Ecological Restoration, Cape Town, 24-28 September 2019.

Nenzhelele E, Todd S, Hoffman MT 2017. Long-term impact of livestock grazing in the Succulent Karoo: A 20 year study of vegetation change under different grazing regimes in Namaqualand. Poster presented at the Student Conference on Conservation Science, University of Cambridge, 28-30 March 2017.

Petersen H 2019. Using long-term ecological data to establish benchmarks for restoration in South Africa's drylands. Paper presented at the 8th World Conference on Ecological Restoration, Cape Town, 24-28 September 2019.

Poulsen Z 2018. Determining restoration potential of livestock grazed Mediterranean shrublands using fenced grazing exclosures. Poster presented at the SERA2018 in Brisbane, Australia 25-28 September 2018.

Razafimanantsoa A 2018. Ecological and Epidemiological Model in Madagascar (E2M2). Annual workshop about statistical and mathematical modelling held in Centre Valbio National Park Ranomafana (Madagascar), 13-22 January 2018.

Razafimanantsoa A, Gillson L, Bond W 2018. Fire and its impact on vegetation dynamics in central highlands of Madagascar over the last 9000 years. Oral presentation at 2nd AFQUA conference in Nairobi, Kenya, 14-22 July 2018.

Razafimanantsoa A 2019. Central Highlands of Madagascar during the Holocene: forested or not? Paper presented at the Fire Management Stakeholder Workshop, Antananarivo, Madagascar, 24-26 July 2019.

Razafimanantsoa A 2019. Long-term change in the forest-grassland mosaic of Central Highlands, Madagascar and its conservation implications. Paper presented at the 8th World Conference on Ecological Restoration, Cape Town, 24-28 September 2019.

Razanatsoa E 2017. The relative impact of climate change and human land-use on the ecosystem in Southwest Madagascar. Paper presented at the Young Scientists Meeting organized by Past Global Changes (PAGES) and the Quaternary Terrestrial Environments group (Pyrenean Institute of Ecology-CSIC) in Spain, 7-9 May 2017.

Razanatsoa E 2017. The relative impact of climate change and human land-use on the ecosystem in Southwest Madagascar. Poster presented at the Open Science Meeting organized by Past Global Changes (PAGES) and the Quaternary Terrestrial Environments group (Pyrenean Institute of Ecology-CSIC) in Spain, 9-13 May 2017.

Razanatsoa E, Gillson L and Virah-Sawmy M 2018. Vegetation response to human land use from paleoecological investigation and its application for future conservation strategies in arid Southwest Madagascar. Oral presentation at 2nd AFQUA conference in Nairobi, Kenya, 14-22 July 2018.

Razanatsoa E, Hall G, Gillson L and Woodborne S 2018. A 700-year rainfall record from Madagascar. Oral presentation at 2nd AFQUA conference in Nairobi, Kenya, 14-22 July 2018.

Razanatsoa E 2019. Response of dry forests to rainfall variability and human land use over the last 2000 years, western Madagascar. Paper presented at the 56th Annual Congress of the Association for Tropical Biology and Conservation, Antananarivo, Madagascar, 30th July to 3rd August 2019.

Rohde RF and Hoffman MT 2016. The fog of historical ecology: vegetation change, sea-surface temperatures and climate change in the Namib desert. Paper presented at conference "Anthropology, weather and climate change", British Museum, London, 27-29 May 2016.

Rohde RF, Hoffman MT and Venter SL 2017. Repeat landscape photography, historical ecology and the wonder of digital archives. Paper presented at SCOLMA conference “Document to Digital: how does digitisation aid African research?” National Library of Scotland, Edinburgh, 11 September 2017.

Schwarzländer M, Moran VC and Raghu S 2016. Constraints in weed biological control: contrasting responses by implementing nations. Oral presentation at 25th International Congress of Entomology in Orlando, Florida, USA, 25-30 September 2016.

van der Merwe H, du Toit JCO, van den Berg L, O’Connor TG 2018. Impact of sheep grazing intensity on vegetation at the Arid Karoo Stocking Rate Trial after 27 Years, Carnarvon, South Africa. Paper presented at the International Long-term Ecological Research (ILTER), Skukuza, 9-13 October 2016.

National conferences, workshops and webinars

Arena G 2017. The influence of habitat on invertebrate communities in the Succulent Karoo. Talk presented at the Arid Zone Ecology Forum, Middelburg, 16 – 18 May 2017.

Arena G 2017. The population size structure of *Aloe claviflora* on the Wolwekraal Nature Reserve in the Prince Albert district. Poster presented at the Arid Zone Ecology Forum, Middelburg, 16 – 18 May 2017.

Arena G 2017. Separating the impacts of land use and rainfall on long-term vegetation change in the rangelands of the Eastern Cape. Paper presented at Postgraduate Mini Conference, Stellenbosch University, 22-23 November 2017.

Arena G, van der Merwe H, Hoffman MTH & O’Connor T 2018. Elucidating long-term vegetation change in the eastern Nama-Karoo–Grasslands ecotone. Paper presented at the Arid Zone Ecology Forum in Robertson, Western Cape, 16-18 October 2018.

Arena G. 2019. Grassland-shrubland shifts in the eastern Nama-Karoo Grassland ecotone. Paper presented at the 54th Annual Congress of the Grassland Society of South Africa, Upington, 1-4 July 2019.

Arena G, Hoffman MTH & O’Connor T, van der Merwe H 2020. Climatic trends in the central-eastern Karoo of South Africa (1875 – 2018). Paper presented at the Arid Zone Ecology Forum Virtual Conference (online), 5-8 October 2020.

Bell W 2017. Land degradation assessment in Namaqualand: Developing the approach and creating a regional land degradation map. Paper presented at Postgraduate Mini Conference, Stellenbosch University, 22-23 November 2017.

Bell WD & Hoffman MT 2018. Mapping land degradation in Namaqualand. Paper presented at the Arid Zone Ecology Forum in Robertson, Western Cape, 16-18 October 2018.

Bell WD & Hoffman MT 2020. Mapping land degradation: habitat condition archetype maps for the Succulent Karoo. Paper presented at the Arid Zone Ecology Forum Virtual Conference (online), 5-8 October 2020.

Dabengwa A 2017. Millennial-scale climate variability and herbivore interaction in the development of short grass patches in a wetland key resource area at Hluhluwe Umfolozi Reserve, South Africa. Paper presented at the Savanna Science Network Meeting, Kruger National Park, 12-17 March 2017.

Daniels K and Klak C 2019. Leaf epidermal characteristics in *Ruschia*. Poster presented at the Arid Zone Ecology Forum, Kimberley, South Africa, 7-10 October 2019.

English KF, Hoffmann JH and Lyons CL 2017. Potential factors influencing the establishment success of *Dicomada rufa*, a biological control agent for *Hakea sericea* in South Africa. Oral presentation at the Congress of the Entomological Society of Southern Africa, CSIR ICC, Pretoria, 3-7 July 2017.

English KF, Hoffmann JH and Lyons CL 2017. Thermal tolerance as a factor influencing the establishment success of *Dicomada rufa*, a biological control agent for *Hakea sericea* in South Africa. Oral presentation at 39th Fynbos Forum, Swellendam, 4-7 August 2017.

English KF, Hoffmann JH and Lyons CL 2018. Ecophysiology and host-agent mismatch as potential factors influencing establishment discrepancy of a biocontrol agent, *Dicomada rufa*. Oral presentation at 40th Fynbos Forum, Goudini Conference Centre, Rawsonville, 31 July-3 August 2018.

Fleury G, Hoffman MT and Todd SW 2016. Environmental change in Riemvasmaak, Northern Cape, South Africa 20 years after resettlement. Paper presented at the Arid Zone Ecology Forum, Prince Albert, 3-6 October 2016.

Forbes C 2018. Invited to speak at a weekly colloquium at The Centre for Complex Systems in Transition, Stellenbosch University, 18 October 2018.

Gillson L 2016. Is scenario planning useful in a complex uncertain world? Paper presented at the 14th Annual Savanna Science Networking Meeting, Kruger National Park, South Africa, 13-17 March 2016.

Henschel J, Walker C and Hoffman T 2018. Karoo: Trajectories of change in the Anthropocene. Paper delivered to the Grassland Society of South Africa, held in Roodeplaat, Pretoria, 25 July 2018.

Hoffman MT 2016. Extreme events and long-term changes in the biomes of the Eastern Cape. Invited keynote paper presented at the Thicket Forum, Addo Elephant National Park, 21-23 June 2016.

Hoffman MT 2016. Historical imagery as a tool for condition assessment: Different or degraded? Invited keynote paper presented at the Biodiversity Planning Forum, Wilderness, 7-10 June 2016.

Hoffman MT 2016. Historical legacies and Karoo futures: Land use and vegetation trajectories in the Karoo. Paper presented at Karoo Futures? Trajectories of change colloquium held at Stellenbosch University, 7-8 November 2016.

Hoffman MT 2016. Plants in Practice: How the direct and indirect uses of Namaqualand's floral diversity has changed. Invited Keynote paper presented at the Green Medicine Symposium, University of the Western Cape, Bellville, 8-10 September 2016.

Hoffman MT, Mostert E, Navarro R, Jack S and Underhill L 2016. rePhotoSA: The repeat photograph project of South African landscapes. Seminar presented to the Mpumalanga Plant Specialist Group, Buffelskloof Nature Reserve, near Nelspruit, Mpumalanga, 14 May 2016.

Hoffman, MT 2017. Looking back to conserve the future: The role of historical ecology in conservation practice. Keynote address at 2017 Symposium of Contemporary Conservation Practice, Fern Hill Conference Centre, Howick, KwaZulu-Natal, 6-10 November, 2017.

Hoffman MT 2018. Keynote speaker at Wilderness Foundation Africa Awards Evening. Kamieskroon, Namaqualand, 29 August 2018.

Hoffman MT, Skowno A, Bell W & Mashele S 2018. Long-term changes in land use, land cover & vegetation in the Karoo drylands of South Africa: Implications for degradation monitoring. Paper presented at the Arid Zone Ecology Forum in Robertson, Western Cape, 16-18 October 2018.

Hoffman MT, Skowno A, Bell W and Mashele S 2018. Long-term changes in land use, land cover and vegetation in the Karoo drylands of South Africa. Oral presentation given at the “Cosmopolitan Karoo: Karoo Futures Workshop – Envisioning land reform in South Africa’s drylands” held at STIAS, Stellenbosch, 26-27 November 2018.

Hoffman MT, Sonnenberg D, Todd SW and Fleury G 2019. Rangeland condition in Riemvasmaak 20 years after resettlement and what it means for conservation, communal areas and land reform in the drylands of South Africa. Invited keynote paper presented at the 54th Annual Congress of the Grassland Society of South Africa, Upington, 1-4 July 2019.

Hoffmann JH 2017. The nice and need to know when evaluating agents. Oral presentation at the 44th Annual Workshop on Biological Control of Weeds, Rhodes University, Grahamstown, 30 October – 01 November 2017.

Hoffmann JH 2018. Evaluating the effectiveness of weed biological control in South Africa – the next step forward. Oral presentation at the 45th Annual Workshop on Biological Control of Weeds, Salt Rock Hotel, Kwa-Zulu-Natal, 29-30 October 2018.

Hoffman MT 2020. The rise of conservation in the Succulent Karoo. Keynote address presented at the Arid Zone Ecology Forum Virtual Conference (online), 5-8 October 2020.

Hoffman MT 2021. Rethinking catastrophe? Historical trajectories and modelled future vegetation change in southern Africa. Webinar presented to the South African Association of Botanists on being awarded the association’s Silver Medal. Online 27th January 2021.

(<https://sabotanyblog.wordpress.com/2021/01/26/webinar/>)

Holden PB, Hoffman MT, Eckardt F, New M, Smit J, Visser M and Ziervogel G 2016. A social-ecological approach to understanding drivers and effects of conservation in the Groot Winterhoek Mountain Catchment and Wilderness Area. Paper presented at the International Long Term Ecological Research Open Science Meeting, Skukuza, 9-13 October 2016.

Humphrey G, Gillson L and Ziervogel G 2016. Tracing the social fire history of the western Caprivi: 19th - 21st Century. Paper presented at the 14th Annual International Savanna Science Network Meeting, Kruger National Park, 13-17 March 2016.

Humphrey G and Gillson L 2017. Anthropogenic influence on fire regimes in North-east Namibia. Paper presented at the 15th Annual International Savanna Science Network Meeting, Kruger National Park, 12-17 March 2017.

Hyvärinen O 2017. The long-term (1984-2017) effect of converting from livestock farming to wildlife conservation on the major vegetation types of the Asante Sana Game Reserve in the Eastern Cape. Paper presented at Postgraduate Mini Conference, Stellenbosch University, 22-23 November 2017.

Impson FAC, Kleinjan CA and Hoffmann JH 2016. Update on the biological control of invasive trees (Acacias, Pines and Prosopis) in South Africa. Oral presentation at 43rd Annual Workshop on Biological Control of Weeds, Roodevallei, Pretoria, 25-27 July 2016.

Impson FAC 2016. The bud-galling wasp, *Perilampella hecataeus*: a potential new agent for *Acacia dealbata*. Oral presentation at 43rd Annual Workshop on Biological Control of Weeds, Roodevallei, Pretoria, 25-27 July 2017.

Impson FAC, Kleinjan CA and Hoffmann JH 2017. Update on the biocontrol of invasive trees (Acacias, Pines and Prosopis) in South Africa. Oral presentation at 44th Annual Workshop on Biological Control of Weeds, Rhodes University, Grahamstown, 30 October - 01 November 2017.

Impson FAC 2017. Biocontrol implementation in the Western Cape: a research perspective. Oral presentation at 44th Annual Workshop on Biological Control of Weeds, Rhodes University, Grahamstown, 30 October – 01 November 2017.

Impson FAC, Kleinjan CA and Hoffmann JH 2018. Update on the biological control of invasive Acacias and Prosopis. 45th Annual Workshop on Biological Control of Weeds, Salt Rock Hotel, KwaZulu-Natal, 29-30 October 2018.

Lyons C and Impson F 2016. The contribution of biocontrol implementation to managing weeds in the Western Cape. Symposium on the Management of Invasive Species, Goudini Spa, Worcester, 18-20 May 2016.

Mashele SS, Bell W & Hoffman MT 2018. Long-term changes (1984-2018) in vegetation productivity of the Karoo: Implications for the degradation narrative. Poster presented at the Arid Zone Ecology Forum in Robertson, Western Cape, 16-18 October 2018.

McAuliffe J and Hoffman MT 2016. Whether or not heuweltjies: Context-dependent ecosystem engineering by the southern harvester termite. Invited keynote opening address presented at the Arid Zone Ecology Forum, Prince Albert, 3-6 October 2016.

Mlokoti T, Impson FAC, Hoffmann JH and Lyons CL 2017. Mortality of the leaf-mining moth, *Aristea thalassias* (Gaert.) F. Muell (Lepidoptera: Myrtaceae), a biological control of *Leptospermum laevigatum*. Poster presentation at the Congress of the Entomological Society of Southern Africa, CSIR ICC, Pretoria, 3-7 July 2017.

Mlokoti T, Impson FAC, Hoffmann JH and Lyons CL 2017. Mortality of the leaf-mining moth, *Aristea thalassias* (Gaert.) F. Muell (Lepidoptera: Myrtaceae), a biological control of *Leptospermum laevigatum*. Oral presentation at 39th Fynbos Forum, Swellendam, 4-7 August 2017.

Mtolo S, Venter S, Navarro R & Hoffman MT 2018. Historical photographs & a decades-long research programme on environmental change. Poster presented at the Arid Zone Ecology Forum in Robertson, Western Cape, 16-18 October 2018.

Nenzhelele E, Todd S, Hoffman MT 2016. Long-term impact of livestock grazing in the Succulent Karoo: 20 years overview. Poster presented at the Arid Zone Ecology Forum, Prince Albert, 3-6 October 2016.

Nenzhelele E, Todd S, Hoffman MT 2017. Long-term impact of livestock grazing in the Succulent Karoo: a 20 year overview. Paper presented at the 2017 SAAB conference, 9-11 January 2017.

Nenzhelele E 2019. Long-term impacts of livestock grazing and browsing in the Succulent Karoo: A 20-year study of vegetation change under different grazing regimes in Namaqualand. Paper presented at the 54th Annual Congress of the Grassland Society of South Africa, Upington, 1-4 July 2019.

Petersen H and Hoffman MT 2016. In retrospect: how the vegetation of the Tanqua Karoo has changed over the last century. Paper presented at the Arid Zone Ecology Forum, Prince Albert, 3-6 October 2016.

Petersen H, Jack SL, Hoffman MT and Todd SW 2016. An environmental gradient analysis of the vegetation types of the Upper Karoo Hardeveld, South Africa. Poster presented at the Arid Zone Ecology Forum, Prince Albert, 3-6 October 2016.

Petersen H, Jack SL, Hoffman MT and Todd SW 2017. An environmental gradient analysis of the vegetation in critical habitats of the Nama-karoo, South Africa. Paper presented at the Arid Zone Ecology Forum, Middelburg, 16-18 May 2017.

Petersen H 2019. Historical and repeat photographs as a source of qualitative and quantitative biodiversity information. Paper presented at the Joint Biodiversity Information Management & Foundational Biodiversity Information Programme Forum, Pretoria, 19-22 August 2019.

Petersen H, Hoffman MT and Henschel JR 2019. Using long-term ecological data to establish benchmarks for restoration in South African drylands. Paper presented at the Arid Zone Ecology Forum, Kimberley, South Africa, 7-10 October 2019.

Petersen H, Hoffman MT 2020. A comparison of bibliographic analyses to identify trends and gaps in Karoo research. Paper presented at the Arid Zone Ecology Forum Virtual Conference (online), 5-8 October 2020.

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Scott SL, Navarro RA, Venter ZS & Hoffman MT 2018. Citizen scientists & the photographic documentation of long-term environmental change in southern Africa. Paper presented at the Arid Zone Ecology Forum in Robertson, Western Cape, 16-18 October 2018.

Todd SW 2016. A review and analysis of the past 30 years of Arid Zone Research in South Africa – movers, shakers and future directions. Paper presented at the Arid Zone Ecology Forum, Prince Albert, 3-6 October 2016.

Tokura, W 2016. Understanding changes in plant productivity using EVI satellite data in Tswalu Kalahari Reserve. Poster presented at the 7th annual Oppenheimer - De Beers Group conference, Johannesburg, 18-19 October 2016.

van der Merwe H, du Toit JCO, van den Berg L and O'Connor TG 2018. Impact of sheep grazing intensity on vegetation at the Arid Karoo Stocking Rate Trial after 27 Years, Carnarvon, South Africa. Paper presented at the Arid Zone Ecology Forum in Middelburg Eastern Cape, 16 – 18 May 2017.

van der Merwe H and Geldenhuys C 2016. Proposed long-term monitoring protocol for *Aloidendron dichotomum* populations. Paper presented at the Arid Zone Ecology Forum, Prince Albert, 3-6 October 2016.

van der Merwe H and Milton SJ 2016. Long-term burn trials at Tierberg LTER revisited after eight years. Paper presented at the Arid Zone Ecology Forum, Prince Albert, 3-6 October 2016.

Van der Merwe H 2019. Long-term *Vachellia erioloba* dynamics in the Kalahari Gemsbok National Park, South Africa. Paper presented at the 54th Annual Congress of the Grassland Society of South Africa, Upington, 1-4 July 2019.

Van der Merwe H 2019. Woody vegetation change (>30 yr) in the interior duneveld of the Kalahari Gemsbok National Park. Poster presented at the 54th Annual Congress of the Grassland Society of South Africa, Upington, 1-4 July 2019.

Van der Merwe H and Milton SJ 2019. A long-term experiment tracking tree shrub species of variable grazing value to understand vegetation dynamics in arid shrublands. Paper presented at the Arid Zone Ecology Forum, Kimberley, South Africa, 7-10 October 2019.

van der Rooyen N, Bezuidenhout H, Bothma J du P and van Rooyen MW 2018. *Vachellia erioloba* long-term dynamics in the Kalahari Gemsbok National Park, South Africa. Poster presented at the Arid Zone Ecology Forum in Robertson, Western Cape, 16-18 October 2018.

van Rooyen MW, le Roux A, van der Merwe, van Rooyen N & Geldenhuys C 2018. Long-term vegetation change (>20 years) in the plains habitat on Goegap Nature Reserve, Succulent Karoo, South Africa. Paper presented at the Arid Zone Ecology Forum in Robertson, Western Cape, 16-18 October 2018.

van Schalkwyk E, Geldenhuys C & Hoffman MT 2018. Is there still a place for single species conservation? The Conservation Symposium, previously the Symposium of Contemporary Conservation Practice, St Ives, KwaZulu-Natal, 5-9 November 2018.

Venter SL, Hoffman MT, Jack SL, Navarro RA & Underhill L 2016. rePhotoSA. Seminar presented at the ADU's 20th Citizen Science Day, Sol Plaatje University, Kimberley, 7 May 2016.

Venter SL, Hoffman MT, Jack SL, Navarro RA & Underhill L 2017. rePhotoSA. Seminar presented at the ADU's 24th Citizen Science Day, Pretoria Botanical Gardens, Pretoria, 25 February 2017.

Venter SL, Hoffman MT, Jack SL, Navarro RA & Underhill L 2018. rePhotoSA: Repeat photography and environmental change. Presentation given to the Durban Botanical Society at Durban Botanic Gardens, Durban, 4 June 2018.

Venter SL, Hoffman MT, Jack SL, Navarro RA & Underhill L 2018. rePhotoSA: Repeat photography and environmental change. Presentation given to the SANBI CREW Workshop held at Wortelgat, Western Cape, 8-10 June 2018.

Venter SL, Hoffman MT, Jack SL, Navarro RA & Underhill L 2018. rePhotoSA: The repeat photography project of southern African landscapes. Poster presentation at the TSEC2018 workshop, Stellenbosch University, 10-11 July 2018.

Local conferences, symposia & workshops and departmental and popular talks

Arena G 2018. Elucidating long-term vegetation change in the Nama-Karoo-Grasslands Ecotone. Oral presentation at the Department of Biological Sciences Research Day, Main Library, University of Cape Town, 30 November 2018.

Bell W 2018. A novel approach to mapping veld condition in Namaqualand. Oral presentation at the Department of Biological Sciences Research Day, Main Library, University of Cape Town, 30 November 2018.

Forbes C, Gillson L and Hoffman MT 2018. A palaeoecological and systems dynamics perspective on land-use management in the CFR. CapeNature's West Coast Quarterly Ecological Meeting, Porterville Library, 22 May 2018.

Gillson L 2016. Dynamic landscape changes in the Anthropocene. UCT Summer School. Oral contribution to lecture series on "Extinctions past and present" as part of UCT Summer School, University of Cape Town, Cape Town, January 2016.

Gillson L 2018. Applied Palaeoecology and Ecosystem Change. Biodiversity Learning Journey, Adaptation Futures. Cape Town, South Africa, (Invited oral), 18-21 June 2018.

Gillson L & Hoffman MT 2018. Inaugural workshop of Transdisciplinary Working Group (TWG) led by Prof Sheona Shackleton of the African Climate & Development Institute (ACDI) to at UCT on 19 September 2018.

Hoffman MT 2017. Oral contribution to lecture series on "Extinctions past and present" as part of UCT Summer School, University of Cape Town, Cape Town, March 2017.

Humphrey G 2018. Connecting Savanna-woodland Societies across diverse fire knowledge & governance scales in north-east Namibia, 11th Annual Science Postgraduate Symposium, University of Cape Town, 11 September 2018.

Lyons C and Impson F 2016. The contribution of biocontrol implementation to managing weeds in the Western Cape. Symposium on the Management of Invasive Species Goudini Spa, May 2016.

Mlokoti T, Impson FAC, Hoffmann JH and Lyons CL 2017. Mortality of the leaf-mining moth, *Aristea thalassias* (Gaert.) F. Muell (Lepidoptera: Myrtaceae), a biological control of *LeptospERMUM laevigatum*. Fynbos Forum, Swellendam, July 2017.

Razafimanantsoa A 2017. Dynamism of the ecosystem in Central highland Madagascar over the last 8000 years. Poster presented at the 10th Science Faculty Postgraduate Symposium, University of Cape Town, 7-8 August 2017.

Razanatsoa E 2016. Sedimentary and dendrochronological records of environmental change and rainfall variability, Southwest Madagascar. Research presented at the 35th International geological congress in Cape Town, 27 August-4 September 2016.

Razanatsoa E 2017. Understanding the impact of rainfall variability and human land-use on the ecosystem: Case of the spiny forest in Southwestern Madagascar. Research presented at the 10th Science Faculty Postgraduate Symposium, University of Cape Town, 7-8 August 2017.

van Blerk J 2017. The Effect of Altered Rainfall Seasonality on Fire-Prone Vegetation in the Cape Floristic Region. Research presented at the 10th Science Faculty Postgraduate Symposium, University of Cape Town, 7-8 August 2017.

Venter SL, Hoffman MT, Jack SL, Navarro RA & Underhill L 2016. rePhotoSA. Seminar presented at the ADU's 22nd Citizen Science Day, Intaka Island Environmental Education Centre, Century City, Cape Town, 9 July 2016.

Venter SL, Hoffman MT, Jack SL, Navarro RA & Underhill L 2016. rePhotoSA. Seminar presented to UCT Photographic Society, University of Cape Town, 5 August 2016.

Venter SL, Hoffman MT, Jack SL, Navarro RA & Underhill L 2017. rePhotoSA: Challenges & benefits to including Digital Libraries. Seminar presented at the UCT Digital Humanities Workshop, Hlanganani Junction, Cape Town, 23 January 2017.

Venter SL, Hoffman MT, Jack SL, Navarro RA & Underhill L 2018. rePhotoSA: Repeat photography and environmental change. Presentation given at SANBI Citizen Science Fair at The Old Mutual Conference and Exhibition Centre, Kirstenbosch National Botanical Gardens, 14 April 2018.

Venter SL, Navarro RA, Venter ZS & Hoffman MT 2018. Citizen scientists & the photographic documentation of long-term environmental change in southern Africa. Oral presentation to the Department of Chemical Engineering, University of Cape Town, Western Cape, 26 October 2018.

Appendix 5: Code of Conduct for the PCU



Vision and Mission and associated Code of Conduct developed for the Plant Conservation Unit

Vision

To be a transformative, inclusive, African-centred research and postgraduate training centre, delivering world class research that contributes to the fair and just conservation of African ecosystems and the sustainable and adaptive management of landscapes and ecosystem services.

Mission

To contribute to the fair and inclusive conservation of African biodiversity and the sustainable and adaptive management of ecosystem services, through excellent interdisciplinary research that brings a past-present-future perspective and that includes the ecological, environmental and social dimensions of landscapes. To provide a supportive, vibrant and inclusive environment that nurtures the skills and passions of tomorrow's conservationists through undergraduate teaching and postgraduate research.

Our commitment

This commitment documents a set of common expectations in relation to the participation and behaviour of all PCU members. It is an active document that will be updated and improved as we learn.

Expectations

- All PCU members will contribute to a fair and equitable workplace (including laboratories, conferences and the field) that is free from harassment, bullying and discrimination.
- We commit to UCT and the PCU's vision for conservation that is fair and just and to the VC's vision "to unleash human potential to create a fair and just society".
- The opinions and ideas of all PCU members will be treated respectfully.
- All PCU members are encouraged to raise concerns about any incident or conduct they find troubling or upsetting, and for those concerns to be taken seriously *

- All PCU members will use, and promote the use of inclusive language, which is language that avoids marginalising people, and is accessible and meaningful to a wide audience.
- All PCU members will aim to engage with communities on research that affects them or is of particular significance to them, to embrace multiple knowledge streams, respect cultural differences, and to follow UCT Science Faculty ethics guidelines that involves human subjects. **
- All PCU members will, via their actions, consider and protect the reputation of the Unit, Department and University, including by the responsible use of Unit resources.
- All PCU members will consider the potential for conflicts of interest arising from their actions, and seek to address them, including by declaring actual and perceived conflicts of interest.
- PCU members will follow UCT's data management policy and the FAIR principles. ***
- Confidential information, and its handling and lawful disclosure, will be taken seriously by all PCU members.

* In addition to following the policies and procedures of UCT organisation, members may raise concerns with their supervisor and the Director of the Unit, in the first instance. Thereafter the UCT's Conflict Resolution process should be followed (HoD, Dean and OIC) ([see here](#)). PCU Members are free to approach the Office of Inclusivity and Change at any point for informal or formal guidance and support.

** Science Faculty Research Ethics Form available at <<http://www.science.uct.ac.za/sci/resources>> ([view PDF](#))

*** Data management policy underpinned by the FAIR principles ([view PDF](#))