

URF FIVE-YEAR REVIEW: EXTERNAL REVIEWERS' REPORT TEMPLATE

Name of grouping	Plant Conservation Unit
Date of review	13/07/2021
Submission date of reviewers' report	10/08/2021
Name of two external reviewers and indicate academic/professional/industry affiliations	<p>1) Rob Marchant Professor of Tropical Ecology Department of Environment and Geography University of York</p> <p>2) Susanne Vetter Associate Professor Department of Botany Rhodes University</p>

1. Research agenda

The extent to which there is a focussed or interlinked research agenda

The PCU's permanent staff complement consists of two academic staff while supported by a good team of Junior Research Officers, Research Assistants and NRF Interns. There is an impressive number of researchers (seven postdocs and 41 postgraduate students) that either have been, or are currently associated with the PCU. This vibrant body of staff is resulting in an increasing number of research outputs in a wide range of disciplinary appropriate journals. Emeritus A/Prof John Hofmann continues to lead the biocontrol research programme which has been aligned with the PCU although this was not the main thrust of the PCU activity and was not a central part of the review process.

The excellent and internationally leading work of Professor M. Timm Hoffman on historical ecology and Professor Lindsey Gillson on palaeoecology makes for a fantastic combination of insight and capacity for understanding ecosystem dynamics. Timm and Lindsey's collaboration is fruitful and complementary, with Timm's exceptional knowledge of South Africa's vegetation and the two engaged scholarship activities that are his legacy (the Paulshoek community research programme and the rePhotoSA project) complemented by Lindsey's strong international profile and wider African focus on palaeoecology and her systems ecology / resilience approach.

Much of the research activity has been applied to the traditional core research area of the PCU, the Greater Cape Floristic Region (GCFR). This core has expanded and evolved as the research agenda has - both thematically, particularly bringing in futures focused work and in research location, particularly bringing in Madagascar. The original GCFR focus has expanded over the past 16 years of the PCU with a very powerful node of insight developing for Madagascar ecosystem dynamics, with current projects focused on the Western Dry Forests, and the Central Highlands. This is an area where there is clearly some excellent insight emerging and there is clear potential for considerable future development. Indeed, given the growth of work outside of the GCRF that now incorporates Desert, Grassland and Savanna biomes of southern Africa, with past and present research focused on Kruger National Park and surrounding ecosystems, Bwabwata National Park, Namibia, Mozambique, and the Drakensberg, the activities of the PCU are clearly expanding to a southern Africa focus.

Having read the previous 5-year review report it is clear that Timm and Lindsey have worked hard and productively to grow the synergy of their research fields and to make clear links of their work

to current conservation issues. The past-present-future approach that underpins the Unit's research agenda is somewhat of a departure from traditional conservation biology but very current in its systems approach to understanding the many drivers that affect biodiversity (land use, climate change and others) and identifying possible pathways to achieving improved biodiversity conservation outcomes.

Lindsey and Timm have clearly given much thought to the issue of reconciling the terms of the Leslie Hill Chair (ecology and conservation in the winter rainfall GCFR) and a broader African focus that includes Lindsey's palaeoecology work in other biomes and regions, including Madagascar. Their vision of maintaining this combination and to grow it is well-supported by their current track record of publications, student training and public engagement, and it would seem that the combination of local relevance (work in the globally unique GCFR) and international (especially African) linkages is also well aligned with UCT's vision.

2. Quality of the research and researchers

The extent and quality of the research conducted in the grouping.

The combination of the work of Timm and Lindsey is to understand how southern Africa's extraordinary diversity and its rich resources have changed over time in response to land use and climate. Timm uses repeat fixed-point photography, the historical archive and long-term monitoring studies. The focus of Lindsey's Applied Palaeoecology Lab is to mainstream palaeoecology into biodiversity conservation and sustainability science, with a focus on African ecosystems.

Clearly Timm and Lindsey are working incredibly hard and their dedication has resulted in a vibrant and successful research group that is the PCU. The quality and quantity of the research output is impressive although this is predominantly focused in traditional media such as academic papers. The publications comprise an appropriate mix of local/national and international scope with a good mix of primary research and review/perspective type publications, important for a unit with an ultimately applied focus. It is good to see that, despite some of the reported difficulties to get some students to complete in time, there are research outputs from a wide range of staff, students and associates – clearly the research done results in publications and Timm and Lindsey undoubtedly invest considerable time and effort into ensuring that students successfully publish. Timm and Lindsey continue to push the boundaries in their respective disciplines and truly are leaders in their field. This excellence has been recognised within South Africa and Internationally. It is particularly that they have been able to maintain and build their recognition as leading scientists in their specialised fields while simultaneously looking towards working more closely with other disciplines and non-academic stakeholders to address wider biodiversity and sustainability challenges. They also have maintained their research profiles while taking on board fundamental transformation and institutional culture issues within the PCU in alignment with UCT's Vision 2030.

The PCU is at a very important stage of their development as they can capitalize on the growth and the raft of opportunities going forward around dealing with challenges on ecosystem management in a rapidly changing world. Knowledge on ecosystem and societal response to climate change and how to address some of the grand challenges in a solutions oriented way will be key focus of future research funding, Government and organisational initiatives. As the range of insights has developed rapidly, clearly the unit is moving from a phase of describing, characterizing and understanding the drivers behind ecosystem change to being able to use this insight in a more applied future thinking way. This transition from a descriptive to a much more interpretive and applied mandate for understanding ecosystem dynamics is very exciting to see.

3. Linkages, networks, and collaborations

Linkages to other research groupings or networks / collaborations.

The multiple challenge that the PCU is working on requires an interdisciplinary approach to understand the interplay, trade-offs and complexities of competing human, biological and environmental drivers to fully understand ecosystem dynamics. In the face of this complexity, the work of the PCU 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. Given the multiple dimensions that need to come together to realise the strengths of the work developed by PCU there is a need to draw on a wider body of expertise from outside the PCU.

The PCU contributes significantly to research activities of the Natural Sciences at UCT, also using this capacity to support interdisciplinary initiatives beyond the biological sciences. There is considerable momentum that can be built on and there is a real and clear need to support the PCU staff. As the thematic areas and the research locations of the PCU have inevitably expanded beyond the GCFR, that has meant that PCU staff will be spread more thinly. Lindsey in particular has continued to expand the interests of the PCU whilst building on the core strength of the unit. This expansion has been aided by a number of successful research projects although this inevitably means that she has increasingly become over-committed as reductions in teaching load and leadership responsibilities and administration have not balanced this expansion and all the new projects are additive.

The PCU has a wide and productive network of collaborations, with a good mix of local (including at UCT), national and international partners. All collaborations reported are active, sustained and productive, judging from the research outputs. These mostly ad-hoc collaborations could be more formalised, possibly whereby UCT partners are given profile on the PCU website and external participants become institutional members signed up with us via an MOU in which there is agreement around mutual benefits. This type of mechanism will allow external members to become an important part of the PCU functioning. This would be of particular importance if the Unit were to develop into a Centre, as has been proposed.

There is clearly a developing interdisciplinary focus of the work within the PCU and this could be expanded further as the Unit develops. There are some well-established links across UCT, but these could be strengthened and in some cases formalised, depending on ongoing research and priorities, e.g. with the African Climate & Development Institute, the Centre for Statistics in Ecology, Environment and Conservation (SEEC) and others. In terms of bringing a spatial landscape component into their work, collaboration with SEEC and with the Department for Environmental and Geographical Sciences may prove fruitful. With the ongoing and developing work around Protected Areas and developing robust policy that incorporate the longer *durée* there might be potential areas of collaborations such as with the Institute for Communities and Wildlife or the Percy Fitzpatrick Institute.

Given the national imperatives for research capacity building in historically disadvantaged institutions, South African funders such as the NRF are insisting increasingly strongly on demonstrated linkages and collaborations with Historically Black Universities (HBUs). We appreciate that this can be a challenge, especially in a field such as paleoecology, which is still quite “niche” even in the historically research-intensive universities. Some strategic thinking about possible HBU partnerships with genuine shared interests would be advantageous to develop, perhaps around some of the more social-ecological and conservation aspects of the research agenda. This would help in leveraging funding and ideally also attracting more Black South African students into the postgraduate school.

The relationship with the Biological Control research group should be resolved. It appears to be a

legacy of past staffing and collaboration that is tapering off, and the synergy with the current PCU focus and activities is tenuous at best. We are unsure what the implications (financial, space, staffing) are for either party if the *status quo* is maintained, and the department of Biological Sciences would need to be included in this decision, but the context of succession planning and re-establishing the PCU facilities would provide a suitable context for dealing with this.

Although suggesting formalising the relations with units, centres and institutes with UCT and with external partners, clearly there is a need for maintaining and building the identity of the PCU. This is in a state of transition that reflects the thematic and research area growth, but also in response to the fire, succession and the ongoing rebuilding phase that they are in.

4. Sustainability and relevance of the research agenda

Sustainability in terms of leadership and resources.

The vision of the PCU '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' is highly relevant and being largely met. The justice component is perhaps not fully in the sphere of the PCU and is not really reflected in the work that is taking place. The vision be reformulated if there is to be a transition to a Centre to enable a stronger alignment to the research and training focus. We feel that there is scope to be more proactive in shaping the agenda on the sustainable and adaptive management of landscapes and ecosystem services, in particular to emphasise why solving these future management challenges really requires the perspectives that Timm and Lindsey can bring to bear. At the heart of the sustainability concept is understanding transitions through time and the environmental and social drivers behind these transitions. At the same time, there is a need to ensure that the research focus is maintained, and is not diluted through engaging in inter-disciplinary work that is already well covered by other groups.

The research agenda is highly relevant and there will be a raft of opportunities into the future around dealing with challenges on ecosystem management in conjunction with the IPCC, IPBES, CBD agenda. Lindsey has engaged in the work of IPBES and given the co-chair of IPCC being hosted in Cape Town and the responses to issues around climate change agenda we would envisage there is great potential for future expansion in this space. There is a huge global momentum in the nature-based solutions space at the moment, which is exciting but also sometimes controversial (e.g. tree planting in nonwoody biomes, equity aspects). Also, there are questions related to the biological limits of some of the proposed nature-based solutions under a progressively changing climate. We believe the past and future perspectives could be very relevant in this space and add to a real gap in our understanding.

The PCU has a strong record of engaged scholarship. Particularly impressive is the long-term research engagement with the Paulshoek community, and it is encouraging to see long-term plans being put in place for its sustainability that do not depend on Timm being a staff member of the PCU. The Paulshoek project achieves several strategic goals of the PCU and UCT more generally: productive research in terms of outputs and students graduated, genuine sustained community engagement with mutual benefit and learning on the part of community and researchers, and a focus on the biodiversity of the Succulent Karoo. It would be good for the PCU to maintain a strong involvement with this project even if the Agricultural Research Council ultimately take responsibility for its running. Reflection on the experience in Paulshoek would also be valuable in informing a future coherent strategy around engaged scholarship by the PCU (or its future Centre equivalent), and might inform a future approach towards engaged scholarship by the PCU, or its centre equivalent.

Timm's rePhotoSA project is also impressive and unique, and a lasting legacy of his work. In engaging citizen scientists it is also a fine example of engaged scholarship.

With the PCU there seems to be an increasing engagement in the Futures work and this is indeed

something the PCU could engage in more. This increasing engagement would need the support of a staff member, or at least well-funded projects led by project-funded researchers with project funded researchers, and would open up potentials into the applied aspects of the work that the PCU is already moving into.

5. Human capacity development and transformation

Research capacity building through recruitment and participation of postgraduate students and / or postdoctoral fellows. Is the grouping aligned to the University's vision of transformation that advance equity and inclusion of previously historically disadvantaged researchers?

We appreciated Lindsey and Timm's clear commitment to human capacity development as evidenced by students graduated, research assistants trained and employed, and ongoing reflection and action to foster a supportive and inspiring working environment. There is evident commitment and efforts to transformative student training and support. The last years at UCT and universities across South Africa more generally have challenged everyone to grapple with issues of historical inequality and achieving an inclusive and affirming institutional culture in institutions still strongly shaped by their colonial legacy. This aspect alone would have required a massive amount of time, energy and commitment from the PCU staff.

Within the review there was a suggestion that the PCU activities are 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'.

While we feel that there is transformation in some areas, there is a need for more of this to happen - this is not a case of 'doing more' but one of making more of what the PCU has achieved. The PCU draws heavily on the pool of students from UCT's undergraduate and honours programmes, many students also join the PCU from other institutions, based on their growing reputation and research activities. With a growing reputation, more could be made of the growing Alumni of the unit as I am sure people who have been through the PCU could be increasingly brought in as research collaborators.

Timm and Lindsey have reflected honestly on these aspects and their portfolio and presentation provided evidence of commitment to transformation. The challenge to bring in more Black staff and students, especially of South African origin, remains, particularly in more senior and permanent positions. We are aware how difficult this can be to achieve, but it needs to be an explicit component of the PCU's planning into the future.

6. Governance and management of the grouping

Evidence of effective governance and management / planning structure.

The self-assessment portfolio provides ample evidence of sound and transparent management and governance, including financial management and relations with the Leslie Hill Trust.

We were very encouraged by the professional behaviour, scientific rigour and ambitious yet collegial behaviour of Timm and Lindsey. Clearly they work well together and have created a supportive and engaging environment. In addition to regular individual supervision meetings, mid-year reviews with each student serve to provide feedback on progress, identify any issues and challenges, and plan the year ahead. The planned symposium to share PCU research findings with key collaborators and stakeholders should be applauded and really needs to bring in wider stakeholders and function as a showcase event.

We were also impressed by the self-reflective ethos of the staff and the openness between Timm and Lindsey to discuss potentially sensitive issues such as the retirement of Timm and succession of the Leslie Hill Chair.

7. Succession planning

Prospects for continuation or evidence of a faculty-integrated succession plan. A succession plan that would effectively manage handover once a director retires. (In cases where there is not much critical mass and the existence of a unit depends on the research interest of the director, it is acceptable not to have a succession plan in place, on condition that the relevant Faculty accepts that the unit will be de-accredited when the leadership retires or leaves the research grouping).

Clearly with Timm coming to retirement there are decisions to be made regarding the next phase of development for the PCU. As this comes on the back of the fire that ravaged the PCU home and decimated most of the historical collections this provides further impetus for a period of reflection and rebuilding. Given the current research strengths in historical ecology and palaeoecology there is a need to develop the in-house modelling capacity (DGVMs, System Dynamics Models, Structural Equation models), alongside stakeholder engagement, to explore the past-present-*future* mandate and simulating past change and exploring future scenarios.

Timm 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 while the Leslie Hill Chair requires the incumbent to have a strong GCFR focus, the director's position could provide greater flexibility in research focus and scope. The plan to build the unit into an expanded, more integrated, interdisciplinary research grouping under the leadership of Lindsey should be supported. We also believe that given the opportunity, Timm would continue to make an important contribution to the PCU's activities after his retirement. We would strongly support him being given Professor Emeritus status should he choose to remain in this position.

While there is some good synergy between repeat photography and palaeoecology foci of PCU this could be strengthened by developing a series of joint projects, possible bringing the highly applied work of charting how access and use of ecosystem services have transitioned in the some of the key areas that PCU works in. This is starting to happen, with findings from the repeat photography and vegetation monitoring work informing questions and hypotheses for the palaeoecological work, but should be encouraged in other areas of the PCU.

As the PCU grows and develops one of the key challenges appears around the lack of opportunity to transition some of the Early Career researchers (ECRs) into junior academic staff. While it is laudable that the PCU can skill people that pass through it and is generating a largely number of graduates into the world that have a deep appreciation on the value of understanding past ecosystem dynamics, it would be great to further and grow some of the PCU shining lights to allow the PCU to grow and evolve. This would require possible broadening the range of funding calls responded to and seeking new funding sources for new, but related themes, and mentoring the ECRs to write these proposals themselves. The Directors do not have the capacity to raise funding for the whole unit on an ongoing basis, and UCT should be playing a much more supportive role in assisting ERCs with funding applications.

8. Classification of the grouping

The classification of the grouping as a unit, centre or institute and its justification in terms of the URC guidelines for nomenclature (See pages 1-2 of the Guidelines). Based on examples of good practice nationally and internationally, these guidelines aim to provide some consistency in nomenclature across the University.

The PCU has been evolving and developing the work and the expansion means the 'Unit' functions more like a 'Centre' when assessing against the defining UCT criteria. We think it would be good to recognize that the unit clearly has a broad research mandate that spans across disciplines, has a formal management structure with the full time members of staff clearly having recognized international standing; as recognised by the upward NRF rating (Gillson) and their contribution to

the global academia. As proposed in the portfolio, with the succession of Timm following his retirement, combined with the rebuilding phase following the fire, there is an exciting opportunity to officially evolve the PCU to a research Centre.

9. Strengths and weakness

Any other strengths and weaknesses of the research grouping, based on the information provided in the self- review portfolio and the review.

There were a number of strengths that were presented that are certainly ripe for development. Furthermore, the PCU would need to be careful that these strengths are retained as it goes through a phase of rebuilding and development. A good example is the active citizen science initiative called rePhotoSA and the long-term research initiative established in the Namaqualand communal areas. These investigations on the impact of natural resource use on Namaqualand's landscapes - changing social, economic and climatic environments of the region are fantastic and the value to have long *durée* and that these long-term investments really need to be maintained and further developed.

Perhaps there could be more seamless connection between the palaeoecological work over centennial to millennial timescales and the annual to decadal perspective coming in from the historical ecology. This very powerful combination to underpin ecosystem management and conservation is central to the PCU's niche and could be further developed. For example, there seems to be little work on combining these insights to feed models in simulating future scenarios of biodiversity and ecosystem service provision under different climate change and management scenarios, and here links with SEEC could be good to explore. While there have been a series of joint initiatives there is potential for these to expand.

The PCU could really enhance its visibility in the public domain. The work that is ongoing by Timm and Lindsey is increasingly visual there should be greater dissemination of the work to a wider range of fora and media over and above the scientific outputs. This will be increasingly important as the 'impact agenda' continues and funders will want to see tangible impacts of research investment over and above numbers of journal outputs. It was noticeable the number of popular articles had declined since the last review. As the PCU takes the next steps there should be a communications strategy; this would have to be created by involving people who are specialists in science communication, and funding for this would need to be secured. Students could also be encouraged to communicate their work in the form of popular articles, blogs and other forms, in the process giving profile both to the PCU and to the students.

Given the wide range of issues that the group connects into, we would encourage to set up and formalise the external collaborations such as that of A/Professor Anneli Ekblom, Dr Richard Telford and Dr Alistair Seddon. In addition to providing great expertise into the group, these solidify the position of the PCU on the world stage. These external links will be increasingly important and there should be more visibility of these. Strategic partnerships with national and international agencies linked to conservation and sustainability could be key for the development of new initiatives. Such connections can develop the national and international profiles of the students and postdocs by promoting their work and increasing its application in conservation, restoration, and sustainability science.

Funding remains a key issue and is likely to be even more so in the future as COVID-19 impacted economies balance their budgets and some of the traditional external partners are unlikely to have spare budgets to explore and support research combinations. Many of the current projects are short term leading to a high turnover of ECRs - while this is not always a problem it can lead to lack of cohesion. Clearly, there are financial challenges across the Higher Education section although UCT should consider funding an additional more junior post to increase continuity, increase the skills base, help with the teaching load, and to provide scope for transformation.

10. Summary of recommendations

The PCU needs to take the period of current reflection to develop a cohesive identity and make some strategic decisions that will shape its future. We believe that this should build strongly on the current foundation of the past-present-future approach integrating palaeoecology with historical ecology, social-ecological systems ecology and scenario planning and to maintain the distinct identity the PCU has crafted for itself, rather than focus too generally on transdisciplinarity and sustainability and risk diluting the very exciting and unique current and envisaged focus. While remaining focused on plants and ecosystems, there are many opportunities, particularly aligned with the post 2020 Global Biodiversity Framework. There is potential to align very closely with the period of collectively moving towards UCTs Vision 2030 and the wider development agenda of the AU 2063 initiative.

There is considerable scope for much greater dissemination. This should not fall on to the shoulders of the already (over)committed staff but through partnerships with media departments in partnering institutions or in collaboration with the Press Office at UCT. There is also potential for more involvement of postgraduate students and postdocs in disseminating research through popular and social media. Popular articles and other media including podcasts and video can really showcase the work of PCU and be used to explore the wider utility and impact of the work.

There is potential for improved interaction with external organisations such as Cape Nature and SANParks but this could be wider engagement, particularly focused around some of the resource challenges such as water and fire management that are acute within the southern Africa / Cape Town context.

We were pleased to see postdoctoral work being increasingly supported; it would be good to see opportunities open up for some of these to develop their career within the PCU.

Clearly there is potential for a refocusing of the work as the Leslie Hill Chair of Plant Conservation becomes vacant following Timm's retirement in 2023. With the growing interest of the PCU to use their insights from the past to constrain and develop appropriate futures work there is potential to invest in this area. While this is an important area, it is crucial to build on the paleo/historical perspectives at the heart of PCU. Timm and Lindsey clearly work well together and it would be ideal to see a continuation and development of this and future appointments focused on the present (remote sensing) and futures (ecosystem/social ecological modelling). Such a combination could make for a really powerful Centre with clear potential to develop into a world leading Institute.

11. Provide an overall reflection of the review documentation and review process and suggestions for improvement.

The documentation was excellent and Timm and Lindsey should be highly commended for putting together an excellent suite of material that made the review very enjoyable and engaging – and this under extremely difficult circumstances for them given the recent fire. The PCU continues 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. Such achievements really need to be captured and disseminated more broadly.

The PCU has the potential to become future leaders in the fair, just and sustainable conservation of biodiversity and the sustainable management of ecosystems and landscapes in southern Africa and beyond - this really needs support to achieve this. This can be done within the existing structures such as continued engagement of Timm Hoffman as he reaches retirement, the future direction of the unit, and filling the key node of future scenarios work / modeller / remote sensor.

The PCU should enhance its visibility in the public domain. The work that is ongoing is highly visual

and there needs to be greater dissemination and the number of popular articles and other popular media should increase. As the PCU takes the next steps, a coordinated communications and outreach strategy should be an integral part of the process. This would have to be created by involving people who are specialists in science communication and not fall to PCU staff.

The fire at UCT and rebuilding of the PCU provides opportunities to push for enhanced environmental standards and to create a new building and future for the PCU. Like the *Protea* we are sure the PCU will flourish after the fire and we look forward to seeing the potentially stunning and impactful group reach its potential in the coming years.