



**Stellenbosch University (Departments:  
Conservation Ecology & Entomology; Botany  
and Zoology) and Nelson Mandela Metropolitan  
University (Department of Botany)**



**Landscape-level assessment of plant resources available to early modern  
humans: Applications invited for 1 MSc and 1 PhD**

The climate and environment of the Cape region of South Africa has caught international attention as the likely refuge for a small population of our ancestors during the exceptional glacial period of MIS6. In a larger, multi-disciplinary and international collaboration (over 30 active researchers from 20 different institutions) we are developing and testing a palaeoscape model to better understand the dynamic co-evolution of people, plants, and animals in this region. To better understand the environmental constraints on societal development at this critical nexus in human history, these advertised projects will address a previously unexplored knowledge gap about the resources to early humans. The aim is to obtain a deeper understanding of the contemporary plant nutritional base (including the biomass, nutritional content and an estimation of nutritional return rates of foraging) over a wide range of rainfall regimes and edaphic environments and a functional understanding of how this resource base would be affected by the lower levels of CO<sub>2</sub>, predicted to have occurred during MIS6. Refer to Marean *et al.* 2014<sup>1</sup> for more information

Students will be working under the umbrella of this exciting, ground-breaking project involving world leaders in a range of disciplines. You will collect interesting data and gain invaluable work and research experience in a multi-disciplinary team.

**We invite applications for the following projects. Registration can occur at any of the institutions / departments mentioned with supervisors, below.**

Important note: The research must occur between March 2015 and December 2017.

**1. Characterization of the Berry resource-scape (PhD). Supervisors: Prof Karen J Esler (ConsEnt, Stellenbosch University); Dr Alastair Potts (Botany, Nelson Mandela Metropolitan University)**

Aim: to characterize the berry resource-scape by:

- determining the spatial and temporal abundance and distribution of berries in the focus study area (Stillbay and surrounding Riversdale Plains), in order to quantify edible biomass contained in these areas;
- identifying high abundance patches of berries (hotspots) which might yield the highest return rates upon foraging, based upon the abundance data collected and analysing the nutritional content of species within such patches;
- determining the encounter rate of hotspots (average time to locate these patches) across different habitat types; and
- determining the inputs required to harvest some of the high abundance, highly ranked species and hotspots, and the energy contained within them: net rate return upon foraging for men and woman of two different age groups.

Outcomes: at least two peer reviewed publications, and contributions towards the palaeoscaping model currently under development (see Marean 2010 and Marean *et al.* 2014 for more details<sup>1</sup>).

<sup>1</sup> Marean, C.W., Cawthra, H.C., Cowling, R.M., Esler, K.J., Fisher, E., Milewski, A., Potts, A.J., Singels, E., De Vynck, J. (2014) Stone Age People in a Changing South African Greater Cape Floristic Region, In Ecology and Evolution of Fynbos: Understanding Megadiversity, editors Allsopp, N., Colville, J.F., Verboom, T. Oxford University Press, Oxford. ISBN 978-0-19-967958;

Marean, C.W. 2010. Pinnacle Point Cave 13B (Western Cape Province, South Africa) in context: The Cape Floral Kingdom, shellfish, and modern human origins. *Journal of Human Evolution*. 59, 425–443.

## 2. An understanding of the links between underground storage organ (USO) and berry productivity and CO<sub>2</sub> levels (MSc). Supervisors: Profs Guy Midgley (BotZoo, Stellenbosch University) and Karen J. Esler (ConsEnt, Stellenbosch University)

Aim: To understand the links between USO and berry productivity and CO<sub>2</sub> levels by:

- Determining the rate of rate of carbohydrate accumulation and quality of selected species with USO's under CO<sub>2</sub> levels typical of MIS 6 using experimental and theoretical approaches to allow for appropriate modeling of the quality and quantity of the resource.
- Determining the rate of rate of carbohydrate accumulation and quality of selected species with berries under CO<sub>2</sub> levels typical of MIS 6 to allow for appropriate modeling of the quality and quantity of the resource, using either/both experimental and theoretical approaches.

Outcomes: at least one peer reviewed publication, and a contribution towards the palaeosciences model.

### Requirements:

- Appropriate degree for admission (Honours or NQF equivalent for MSc; MSc for PhD)
- appropriate experience (especially in plant physiology and/or ecophysiology) and a good academic record
- Code 08 driver's license is a recommendation
- Ability to work independently in the field and in a team
- Competence in experimental design and statistics
- Full computer literacy

### Value:

MSc bursary is R50,000<sup>2</sup> pa for two years, with preference being given to South African citizens.

PhD bursary is R90,000<sup>3</sup> pa for three years.

Additional project running expenses are provided for both projects.

**How to apply:** Applicants should send a letter of application for one or both projects (please indicate which) and include reasons for your interest in the project/s and outline how you work independently in an organised way, a CV that includes your academic record, any scientific publications on which you have been an author, academic transcripts and the names of at least two academic referees. Please submit your application by **13 February 2015**.

Submit applications directly to (or request additional information from):

**Prof Karen J Esler**, Head of Department, Conservation Ecology and Entomology, Stellenbosch University, kje@sun.ac.za (Projects 1 & 2)

**Dr Alastair Potts**, Botany Department, Nelson Mandela Metropolitan University:  
Alastair.Potts@nmmu.ac.za (Project 1)

**Professor Guy Midgley**, Department of Botany and Zoology, Stellenbosch University, gfmidgley@sun.ac.za (Project 2)

<sup>2</sup>R40 000 from NRF (Competitive Grant 93487) and R10 000 sourced from team project funding, with possibility of further top-up depending on availability of funds

<sup>3</sup>R60 000 from NRF (Competitive Grant 93487) and R30 000 sourced from team project funding, with possibility of further top-up depending on availability of funds.