

NCCARF Report for PhD short collaborative travel visit to South Africa

Anne Cochrane (15 January to 9 February 2011)

My visit to South Africa commenced with my attendance at the 37th Annual Conference of the South African Association of Botanists in Grahamstown, Eastern Cape Province, where I presented some of my current seed research describing a screening process for determining temperature thresholds in the germination niche. This research has formed the preliminary basis to my PhD investigations. The presentation generated considerable interest and I was subsequently invited by Prof. William Bond to give a seminar to staff and students at the Botany Department at the University of Cape Town (UCT), where I was given some excellent feedback on methods to analyse my data.

I spent two and a half weeks in Cape Town at the South African National Biodiversity Institute (SANBI) offices located in the magnificent gardens of Kirstenbosch below Table Mountain. SANBI is a world leader in conservation, applied biodiversity science and climate change. In particular, the Institute is well known for its research on the bio-diverse winter-rainfall biomes of the Fynbos and Succulent Karoo in South Africa.

The primary goal of my visit to South Africa was to draw on the expertise of SANBI climate scientists to help develop an effective design for the field component of my PhD project. This project aims at gaining an understanding of the impact of drought and heat stress on seed germination and seedling growth and survival of WA *Banksia* species (Proteaceae). To this end I met with Dr. Charles Musil and his PhD student Judy Arnolds who have been working on drought tolerance in Proteaceae under glasshouse and common garden experimental conditions. I also had the chance to meet with Dr. Guy Midgley and discuss with him my ideas for seed research and climate change. I was shown a rain exclusion experimental site at Jonaskop, some 3 hours drive north east of Cape Town. Here at this site permanent climate monitoring sites have been established across an elevational gradient of more than 800m and a number of drought stress experiments have been conducted over the past few years.

I met with UCT climate researchers (Dr. Adam West and Dr. Ed February) who provided sound advice for construction of rain out shelters used for testing drought response on vegetation. I was strongly advised to ensure structures were sufficiently durable to withstand high winds and coastal salt laden air. I also had a number of fruitful meetings with Dr. Penny Mustart, who is currently writing up work on drought stress in seedlings and made contact with Prof Karen Esler from Stellenbosch University. A number of these field-based climate change projects are in the process of being written up for publication.

This NCCARF travel grant provided me with the opportunity to advance my understanding of procedures for manipulating climate in the field and there is no doubt that my project will be measurably extended and improved by this visit to South Africa. The expertise of SANBI and UCT researchers in manipulating and modelling the effects of climate change on terrestrial biodiversity has been invaluable for my project design, and this in turn will add significance to adapting and protecting Australia's terrestrial biodiversity.

Due to advice by my South African colleagues I have modified the design of my field experiment and will now employ heating lamps to warm the soil rather than constructing open top chambers. Both methods have been used in the past by researchers from SANBI and they consider the lamps to be far superior for warming. Soils can be better heated during the night time with lamps and warming scenarios for SWWA point to a greater degree of night time warming than day time warming; open top chambers have little effect on night time temperatures.

I am confident that the personal contact with SANBI and UCT researchers will engender some future research collaboration in seed and seedling threshold research and field studies aimed at providing validation for bio-climatic models as we work towards increasing our collective understanding of climate change threats to southern hemisphere Mediterranean biomes.



A warming experiment for seeds and seedlings at SANBI, Cape Town.



Rainout shelters at Jonaskop, north of Cape Town.



Permanent weather station at Jonaskop, north-east of Cape Town.



Rainout shelters at Silvermine, south of Cape Town.