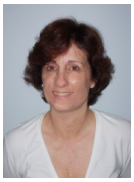
Edition (2)
October 2009

NCCARF
National Climate Change Adaptation Research Facility
Adaptation Research Network TERRESTRIAL BIODIVERSITY

Terrestrial Research E-bulletin



Convener's Update

Welcome to the second edition of the Terrestrial Research E-bulletin (TRE). Since the last issue there have been many exciting happenings in the Terrestrial Biodiversity Adaptation Research Network.

Most significantly, the draft National Adaptation Research Plan (NARP) for Terrestrial Biodiversity was released in late September and the consultation phase of this process is underway. The NARP identifies critical gaps in the information required by governments, industry and the community to address adaptation responses to climate change. It will also determine the priority areas for funding by the Department of Climate Change - expressions of Interest for research projects will be called for later this year.

The document is open for public consultation at http://www.nccarf.edu.au/node/201 until the **30th of October.** This is your chance to have your say and provide feedback on the content of the NARP.

In August our Network ran a symposium at INTECOL, the 10th International Ecological Society meeting, where 17 presenters spoke on the topic of Protecting Biodiversity: Adapting to Global Climate Change. The symposium was well attended and much positive feedback was received.

From the 9th- 13th November, a group of 15 national and international scientists will meet in Cape Tribulation, North Queensland, for the first workshop for the Terrestrial Biodiversity Network on Dynamic Conservation Planning. Participants will discuss the directions that conservation planning will need to take in the face of climate change. A summary of outcomes will be provided in the next issue of TRE.

In this issue we have some great articles from our Network members, and a special focus section on climate change impacts and adaptation projects in Western Australia.

Along with our Conference Update, we also introduce a new regular slot, 'Must Read', where we bring you a summary of the most important recent publications on climate change adaptation research.

We hope you enjoy this issue!

Steve Williams & Lesley Hughes

In this issue:

Focus on WA	2
Brisbane Vulnerability Assessment	3
Must Read	3
Invasive Species and Climate Change	4
Conference Update	4

Meet the Steering Committee

Professor Ary Hoffmann

Ary is the director of the Centre for Environmental Stress and Adaptation Research at Melbourne University in Victoria.

His research group aims to understand how organisms evolve and adapt to rapid environmental changes.

They are also working to identify the genes involved in adaptation to environmental shifts, and understand why some species are climatically restricted while others are not. The group also uses ecological and evolutionary principles to improve pest control.

Ary's field sites are located in the Victorian alpine region, the eastern Australian climate gradient, the southern wheat belt, and streams around Melbourne.

Focus on Western Australia

South-west Western Australia (SWWA) is one of 34 global biodiversity hotspots recognised by Conservation International. The only Australian hotspot on the list, the region supports high levels of terrestrial endemic plants and vertebrates. However, SWWA is also predicted to experience the most severe impacts of climate change on the continent. Significant declines in rainfall and lowered groundwater and wetland levels are already evident and are projected to continue and intensify. Here we highlight climate change impact and adaptation projects currently underway in this unique region.

Possums in Peril?

The honey possum, or noolbenger, is a Western Australian icon. Endemic to SWWA, this charismatic mammal is neither a possum, nor does it eat honey. Instead, it gathers pollen and nectar and relies on the predictable flowering of native shrubs and trees.

But this specific feeding behaviour could make honey possums vulnerable to climate change, as flowering and nectar production are related to rainfall.

Network member Dr Leonie Valentine, and colleagues in the Gnangara Sustainability Strategy group at the Department of Environment and Conservation in Perth, have been investigating the potential impacts of declining rainfall on honey possums in the Swan Coastal Plain region.

Using previous data which relates honey possum abundance to rainfall, they modelled the potential decline in honey possums across different estimates of reduced rainfall. Under a worst case scenario of 50 per cent decline in annual rainfall, honey possum abundance could fall by more than half of current estimates.

Declining rainfall could reduce key honey possum habitat and food resources. **(© P.Valentine)**

Climate change is also expected to affect fire regimes and reduced rainfall could lead to increased wildfire in SWWA.

Using data from recent honey possum trapping surveys, Dr Valentine and co-workers found that honey possums are most abundant in Banksia woodland unburnt for more than 16 years. Capture rates at these sites were more than double those in recently burnt sites.

"Ensuring the retention of this long unburnt habitat should help honey possums adapt to climate change." says Dr. Valentine. "Ideally, long unburnt patches would be in a matrix of different fire ages to reduce the chance of wildfire removing key habitat."

A Rocky Future

In the ancient, flat, and fragmented landscape of SWWA, there is little scope for native plant species to migrate or shift their distribution to new habitats in the face of climate change.

But the region is characterised by numerous granite outcrops and inselbergs (isolated rocky hills) and a new research project is investigating whether these landscape features could act as climate refuges for the unique native flora in this biodiversity hotspot.

The project is lead by Steering Committee Member Grant Wardell-Johnson, from Curtin University in Perth, and is funded by the Australian Research Council until 2011.

Granite outcrops are already important for plants in WA as they harbour around 10% of the State's gazetted threatened species. It is also likely they acted as refuges for plants during past climatic events.

The ambitious study asks key questions about the ability of granite outcrops to act as climate refuges and facilitate the persistence of plant species.

Dr. Wardell-Johnson and colleagues will investigate whether the micro-climate within outcrops is buffered from conditions outside, and whether this could protect poorly dispersed narrow range endemic plant species against the impacts of climate change.

Rocky outcrops such as Boyagin rock near Brookton in SWWA, provide a variety of habitats for native plants and could act as refuges from extreme heat and drought. **(© G. Wardell-Johnson)**

The project is the first to examine the ability of species to survive in climate change refugia, and will link results and outcomes with conservation plans for key plant species. These include granite outcrop endemics like *Eucalyptus caesia* and *Verticordia staminosa,* and those confined to resource rich areas around the base of outcrops like *E. brevistylis*.

'The Earths biota faces profound risks from climate change. The identification and **management of climate refugia is a vital component of climate change adaptation strategies** and will be crucial in determining priority conservation and management areas.' says Dr Wardell-Johnson.

Embracing Uncertainty: Biodiversity Vulnerability in a Sub-tropical City

By Mr Stacey McLean, Senior Program Officer Biodiversity Planning, Brisbane City Council.

Brisbane City Council's 2006 vision statement *Living in Brisbane 2026* acknowledged the need to prepare for, and respond to, predicted climate change impacts on the city's inhabitants and natural environment.

In 2007, a high level plan of action was adopted by the Council which aimed to better understand climate change threats to the city's biodiversity and how they may influence future conservation strategies.

Brisbane City Council's review identified key refugia sites, including Gold Creek, Mt Coot-Tha.

A preliminary review of biodiversity vulnerability was undertaken by Dr Tim Low, who identified a range of potential impacts, and associated adaptation measures, associated with predicted climate change in the region.

The review highlighted the value of existing data sets and asset mapping in climate change adaptation planning.

Priority actions were identified, including protecting 'cool' sites, such as south-east facing gullies, and priority restoration of potential refugia.

The exercise enabled the Council to embrace the uncertainty that permeates climate change risk forecasting and move forward in an informed way, employing corporate and other resources available.

A more detailed vulnerability assessment is under-way which documents threatened species, habitat types, landscape features and other natural assets vulnerable to climate change within the Brisbane City Council region.

This work feeds into a broader Council climate change adaptation project, undertaken through the ICLEI-Local Governments for Sustainability-Oceania Adaptive and Resilient Communities (ARC) Program. A key product will be the development of a set of investment options to consider in responding to climate change impacts.

More Information:

http://www.brisbane.qld.gov.au/BCC:BASE:1044856849:pc=PC_2643
http://www.brisbane.qld.gov.au/BCC:BASE:1621287850:pc=PC_2867

stacey.mclean@brisbane.qld.gov.au

Must Read

Hot off the press— papers and reports on climate change adaptation

- **'*Convenient solutions to an inconvenient truth: Ecosystem based solutions to climate change*' Environment Department, The World Bank.**

  This report argues the case for ecosystem based approaches to mitigate and adapt to climate change.

  http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2009/07/08/000333037_20090708013334/Rendered/PDF/493130ESW0whit10Box338946B01PUBLIC1.pdf

- *'**Australia's Biodiversity and Climate Change: Summary for Policy Makers 2009'.***

  This Federal Government report focuses on terrestrial biodiversity and summarises the key issues for policy-makers derived from an extensive vulnerability assessment.

  http://www.climatechange.gov.au/impacts/pubs/summary-policy-makers.pdf

- ***'Climate change, connectivity and conservation decision making: back to basics.'** Hodgson et al. (2009) Journal of Applied Ecology*

  This potentially controversial article argues that the importance of habitat connectivity has been overemphasized in climate change adaptation strategies and proposes that other measures should be considered before connectivity projects are undertaken.

  DOI: 10.1111/j.1365-2664.2009.01695.x

- ***'Climate change, habitat loss, protected areas and the climate adaptation potential of species in Mediterranean ecosystems worldwide.'***

  Kalusmeyer & Shaw (2009) PLoS One.

  This paper examines the potential impact and adaptation potential of the world's five Mediterranean-type ecosystems to climate change. It concludes that south-west Western Australia should be considered the highest priority Mediterranean region for investment in climate-change adaptation strategies.

  http://www.pubmedcentral.nih.gov/picrender.fcgi?artid=2712077&blobtype=pdf

Climate Change and Invasive Species: Double Trouble? By Dr Carol Booth, Invasive Species Council.

Climate change is expected to cause extinctions when native species can't migrate out of hotter or drier habitats to more suitable climates.

But many of the greatest threats could be from organisms that gain competitive, predatory or other advantages under climate change. In particular, invasive weeds, pests and pathogens could cause much greater harm. Climate adaptation measures should address invasive species threats in three ways:

- Reduce existing threats to increase the capacity of native biodiversity to adapt to climate change.
- Control invaders or potential invaders likely to benefit from climatic changes.
- Prevent new introductions, ensuring that responses to climate change do not worsen invasive species threats.

High priorities include fighting the dieback disease *Phytophthora cinnamomi*, which could get much worse in some areas under climate change, and checking the spread of flammable pasture grasses.

New biofuel crop species, or cultivars of weedy pasture plants bred to tolerate dry conditions, should only be released if they pose low invasive risk.

Exotic vines could invade cyclone damaged forests under climate change and make them more vulnerable to future damage.

Weedy garden plants that could spread into warming alpine areas or cyclone-damaged tropical forests should be eradicated, and invasive predators controlled where they compromise the potential for native species to adapt.

The impact of invasive species benefiting from climate change may exceed the direct impacts of climate change in many cases, as noted in a recent assessment of the vulnerability of Australia's biodiversity to climate change*.

Climate change adaptation requires better laws, policies and programs on invasive species.

For further information and to subscribe to ISC's Double Trouble ebulletin: http://www.invasives.org.au

*Steffen et al. (2009) www.climatechange.gov.au/impacts/biodiversity_vulnerability.html.

Conference Update

Climate Change Adaptation Futures: preparing for the unavoidable impacts of climate change. Gold Coast, Queensland, 29 June—1st July 2010. Registration now open, **abstract submission closes 18 January 2010.** www.nccarf.edu.au/conference2010,

The Second International Conference on Climate Change: Impacts and Responses. University of Queensland, Brisbane, 8-10 July 2010. Abstract deadlines available at: http://www.Climate-Conference.com/.

Climate Change: 2010 Conference of the Siebel Scholars, Massachusetts Institute of Technology. Updates available: http://siebelscholars.com/conferences/2010.

Climate Change and Birds. British Ornithologists Union Conference, University of Leicester, UK, 6-8 April 2010. Updates available: http://www.bou.org.uk/

About the Adaptation Research Network for Terrestrial Biodiversity

The Adaptation Research Network for Terrestrial Biodiversity is one of eight Research Networks administered by the National Climate Change Adaptation Research Facility - www.nccarf.edu.au.

It is hosted by James Cook University in Townsville.

Convenors:
Assoc. Prof. Steve Williams
Ph.: +61 (0)7 4781 5580
stephen.williams@jcu.edu.au

Prof. Lesley Hughes
Ph.: +61 (0)2 9850 8195
lhughes@bio.mq.edu.au

Coordinator:
Dr Yvette Williams
Ph.: +61 (0)7 4781 5552
yvette.williams@jcu.edu.au

TRE Editor:
Dr Jo Isaac
joanne.isaac@jcu.edu.au

Our Website
www.nccarf.edu.au/terrestrialbiodiversity

To subscribe to our Network - www.nccarf.edu.au/terrestrialbiodiversity/node/10

For more information or to join our Network, please email yvette.williams@jcu.edu.au.

To contribute stories or ideas to TRE, please email joanne.isaac@jcu.edu.au

TB Network Partners