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

Terrestrial Research E-bulletin

Convener's Update

A very happy new year to all our readers, and we hope you have a productive 2012.

Welcome to the first edition of the TRE-Bulletin for 2012. We hope you had a safe and happy Christmas and New Year.

Once again this year the network will offer research grants for Honours and Masters students, and collaborative travel grants for PhD students. Please note that this year only one round will be offered in March /April. Notification of this funding release will be sent around in March.

In the first 6 months of the year the network will also run a workshop on Bushfires, Biodiversity and climate change. This workshop will be convened by Prof David Bowman and Dr Dick Williams in Hobart from the 21st to 25th May 2012.

The greatest happening for this quarter in the network is the commencement of the Terrestrial Biodiversity NARP funded projects. In total 8 projects have been directly funded form the Terrestrial Biodiversity funding and 2 other projects have be cross sector funded. All projects have a completion date of April 2013.
To find out more about the projects which have been funded we feature two project summaries in this issue, and will feature more in the next issue. Also if you would like to see a full summary of all project synopsis please go to: http://www.nccarf.edu.au/ARGP-TB

In addition to the special NARP summaries section, we also bring you an article on the impact of cylone Yasi on different tree species in Queensland, and the implications for adaptation management, along with our usual conference update.

We hope you enjoy this issue, and please do not forget to contact us with ideas or submissions for articles for TRE-Bulletin this year,

Steve Williams & Lesley Hughes

In this issue:

Meet the Steering Committee

Prof Grant Wardell Johnson

Grant is associate professor of Biodiversity and Climate Change at Curtin University, Perth, Western Australia.
His research centre's on biogeographic survey and forest and disturbance ecology, including climate change impact assessment. He has a particular interest in refugia and forests – including those in high-rainfall Mediterranean ecosystems.
Grant is Director of the Curtin Institute for Biodiversity and Climate, and leader of the Curtin University Climate Change Refugia group, with a keen interest in identifying and conserving climate change refugia.
He has more than 100 publications, including journal articles, book chapters and books, is editor or co-editor for a number of journals and also sits on a variety of committee's and panels. He also supervises a significant postgraduate program.

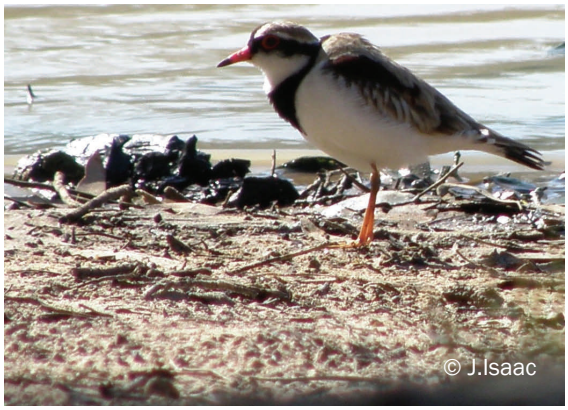
NARP FUNDING

In 2011, funding outcomes were announced with respect to $4.2million, in the form of Climate Change Adaptation Reseach Grants. Applicants were asked to specifically address the National Adaptation Research Priorities (NARP's), as identified in NARP's for each NCCARF Network. Approximately $2million of this money was awarded to Terrestrial Biodiversity NARP research. In this issue, and next, we highlight a number of the projects which were successful.

Climate Change Adaptation Strategies for Australian Birds

Stephen Garnett, Charles Darwin University, Northern Territory.

Our NCCARF funded Research Grant in the area of terrestrial biodiversity has the ambitious aim of creating a strategy for those Australian birds that are most vulnerable to predicted climate change. The work builds on the recent Action Plan for Australian Birds 2010 which has produced a strategy for assessing the status of all 1,234 Australian bird taxa, but which did not include climate as a threat in any systematic manner.



Birds have already been affected by climatic changes in a variety of ways. This study will combine life history, abundance and modelling to predict impacts and adaptation strategies for many Australian birds.

Identification of most threatened taxa

We will identify bird species most likely to be threatened by climate change and will determine the extent to which present day distributions of bird species will be affected by climate change. We will:

- assemble the biggest database of observations of Australian birds ever established;
- use this database to determine the present day climate requirements for each species;
- compare these requirements with a range of future climate scenarios for Australia to understand the rate and scale of climate changes that might be faced by each bird taxon;
- assess each bird taxon against a suite of variables that will help us to determine their sensitivity to, or ability to adapt to, a new climate. Factors will include their reproductive rates, and whether they live in habitats likely to be inundated by seawater or have already demonstrated an inability to cope with heat waves.

There are challenges with this approach in that regionalising of climate models is tricky and it can be difficult to assess the predictive power of such indicators, but we need to have some way of focussing attention on those birds that are most likely affected. All of our databases will be made available on-line.

Adaptation Action

Once we have determined which taxa are most vulnerable to climate change, we will consider the best adaptation options for each taxon by reviewing them against a hierarchy of potential adaptation actions. These may include ensuring habitat is available for natural movement in the face of climate change, assisted relocation, and even captivity. The strategies involved will be validated, as best we can, with biodiversity managers in different jurisdictions and with Australia's large network of avian experts, to ensure that what we are suggesting makes sense. The costs of implementing each action will be assessed so we have some idea of the potential national bill for retaining our legacy of bird biodiversity for future generations.

Information Dissemination

Research outputs will be made available through online databases and the final results will be produced as a book. This Climate Change Adaptation Plan for Australian Birds will identify and prioritise those birds that require adaptation strategies and where and when to implement these strategies to maximise outcomes. We intend to write a range of peer-reviewed publications that will ensure that our approach and suggested way forward are validated by the wider scientific community.

Determining future invasive plant threats under climate change: a decision tool for managers

Lesley Hughes, Macquarie University

in collaboration with Michelle Leishman (Macquarie University), Paul Downey (University of Canberra), Peter Smith (NSW OEH), Jackie Steel (VIC DPI) and Stephen Johnson (NSW I&I)

Our research aims to determine the potential threat from naturalized, but not yet invasive, alien plants under climate change and to assess how these species may interact with other key stressors. We will develop a decision tool for managers that prioritises eradication programs towards those naturalised species that could become invasive with climate change and/or through the interaction with other key stressors.

Invasive weeds, such as blackberries (a WoNS), can have a huge impact on native landscapes and fauna. This study will determine the risk of other species becoming invasive under climate changes in the future (© Kai Goodman)

Identifying species and threats

We will collate the global distribution records of around 400 naturalised plant species and then use future climate scenarios for 2020 & 2050, combined with species distribution models, to define climate envelopes and future climate suitability for each species. This will build on previous research assessing potential future distributions of Weeds of National Significance (WoNS), and the National Alert listed species.

We will also collate information on the attributes of the plant species modeled, including physical traits, environmental tolerances, soil associations and known threats. The database will also include information on how each species is likely to interact with other key impacts on biodiversity, including, but not limited to, changes in fire regimes, drought, elevated CO_2, and habitat degradation.

We will assess areas of invasion potential for each of the ~400 species at a number of spatial scales & for a number of different jurisdictions by spatially overlaying in ArcGIS their potential future distribution with layers containing (i) major vegetation types of Australia (ii) Australian protected areas (iii) the 56 NRM regions (iv) local government areas (v) Endangered Ecological Communities and (vi) other sites of conservation significance such as RAMSAR sites & locations listed as critical habitat for endangered species under federal & state legislation.

Adaptation Actions

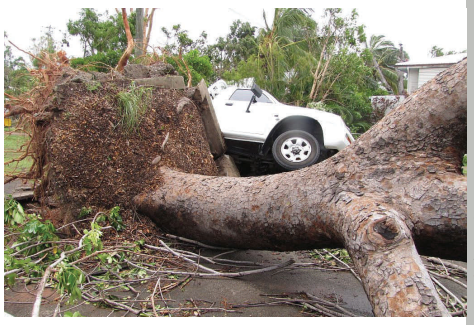
We will assign a threat category to each species along with a category to each potential area of invasion based on the feasibility of delivering effective weed control, the level of threat present, and the importance of the site. This approach, developed by NSW DECCW is currently used to assess threats in known invasive species, but is yet to be adapted to naturalised plants. Threat categories will assist managers to prioritise management actions and highlight those species for which resources should be used to attempt eradication before the species reaches its full invasion potential.

Information Dissemination

A decision support tool for land managers, consisting of a searchable, online database will be developed that can be interrogated by species name, area, threat category, & potential for interaction with other key stressors. Results and the availability of the support tool will be publicised via media releases about the website during its launch, presentations to natural resources managers & other stakeholders, information sheets, publication in local journals such as Ecological Management & Restoration, & more broadly in peer-reviewed journals & at conferences.

Adapting to Cyclones: The role of trees and what we learnt from Cyclone Yasi

Future predictions indicate that cyclone activity will increase under climate change, with cyclones becoming more common, and possibly occurring further south in Australia than previously.
Therefore, understanding the response of the environment to cyclones, and the potential for aspects of the environment to mitigate some of the impacts, is of interest and importance.
Tree's can offer significant benefits during a cyclone, including reducing wind loading on buildings, intercepting flying debris, offering protection to other plants, reducing erosion along rivers and storm-damaged beach fronts, and potentially preventing the loss of roofing from houses.



Shallow-rooted African Mahoganies were conspicuous among trees damaged by Cyclone Yasi (© G. Calvert).

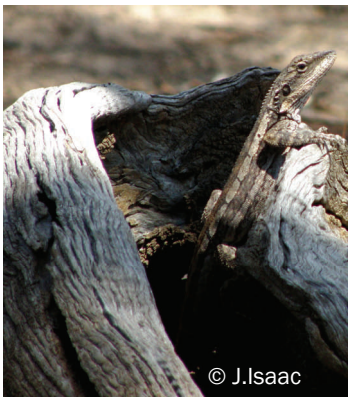
Windbreaks are particularly valuable in absorbing the energy from wind gusts, so even minor reductions in wind speed can have significant benefits for buildings. Flying debris is one of the most significant causes of death and property damage during cyclones and the role of trees in capturing this material is widely known.
However, some species of tree fare better than others during cyclones. Following the landfall of severe cyclone Yasi, in February last year, Dr Greg Calvert carried out a detailed study, funded by Ergon Energy and Townsville City Council, to assess how different tree species responded in the Townsville area.
Calvert found the most common form of tree damage was uprooting, followed by snapped trunks and broken branches. Large trees contributed the most to uprooting and snapped branches. Although the sample of damaged trees in Townsville included 2,584 trees in 151 species, it was shown that damage occurred primarily in a small number of species. Exotic species (not native to Queensland) contributed more than twice as much green waste as non native trees, but there were resistant and susceptible species amongst both native and exotic trees. The most susceptible species included yellow flame tree, African mahogany, river blue gum, weeping fig and pink trumpet tree. These five species contributed more than 50 percent of damage and green waste. In dollar figures, these five species may have caused up to $75 million in damage.
In terms of adaptation, Calvert recommends a number of strategies, including discouraging the use of sensitive species and encouraging planting of resistant species, and planting beach fronts with broad rooted resistant species. Efforts are also underway to move susceptible species away from sensitive areas such as roadsides, near powerlines and near other important infrastructure.
Read the full report: http://www.greeningaustralia.org.au/uploads//Our%20Solutions%20-%20Toolkit%20pdfs/QLD_2011_Cylone_Yasi_tree_assessment_report.pdf

Conference Update

Water & Climate: Policy Implementation Challenges. Canberra, Australia, 1-3 May 2012. Abstract submission closed. http://www.climatechange2012.org/program/?IntCatId=27

Climate Change 2012. Seattle, Washington, USA. 12-13 July 2012. **Abstract submissions by 14 February 2012.** http://on-climate.com/conference-2012

NCCARF National Adaptation Conference. Melbourne, Australia, 26-28 June 2012. **Abstract submissions by 17 February 2012.** http://www.nccarf.edu.au/conference2012/



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.

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To subscribe to our Network - http://nccarf.jcu.edu.au/terrestrialbiodiversity/index.php/register

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TB Network Partners