

Science to inform investment decisions for developing Northern Australia



David Karoly

Earth Systems and Climate Change Hub

Michael Douglas

Northern Australia Environmental Resources Hub

Brendan Wintle

Threatened Species Recovery Hub

National Environmental Science Program



- The latest in Australian Government environmental research programs, funded since 2007 (Commonwealth Environment Research Facilities, National Environmental Research Program and National Environmental Science Program)
- Program funding from 2015-2021, \$145 million, plus co-investment ~ \$300 M +
- Six research hubs with annual research plans



National Environmental Science Programme



National Environmental Science Programme



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National Environmental Science Programme

Delivers collaborative, practical and applied research to inform decision making and on-ground action

Research has real impact through the partnerships and collaboration between decision makers and scientists



Earth Systems and
Climate Change
Hub

National Environmental Science Programme



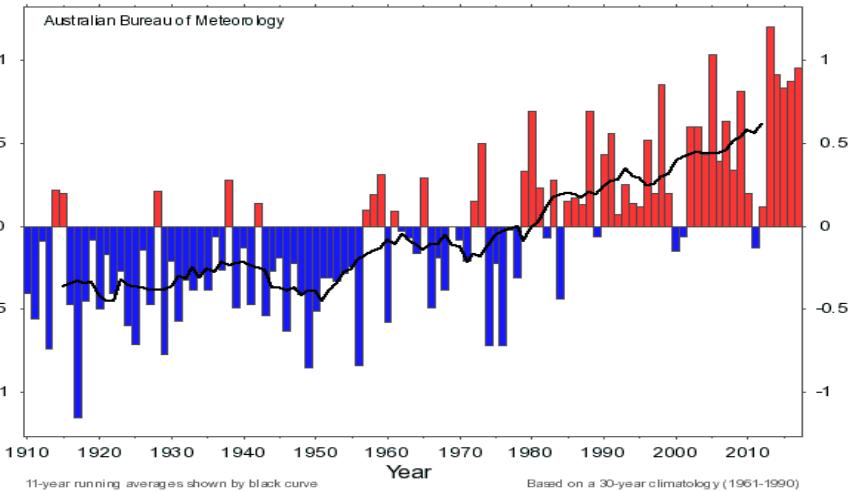
Climate change risks for developing northern Australia

Professor David Karoly

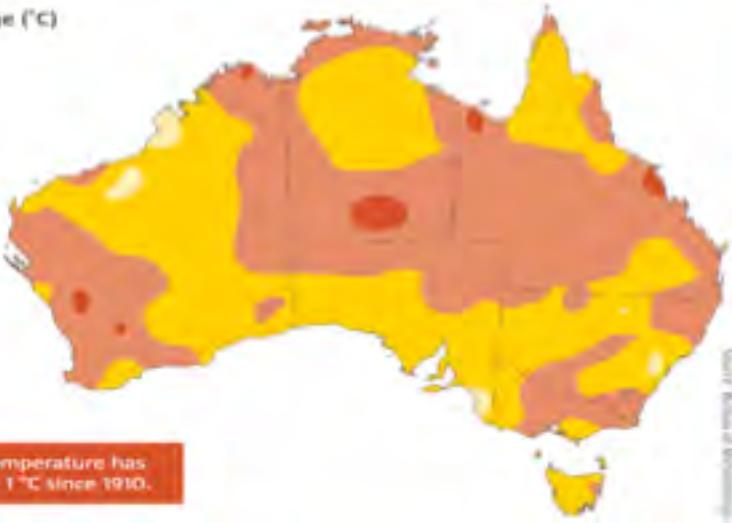
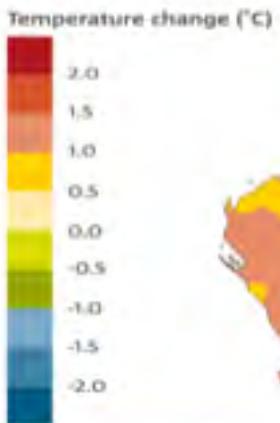
Recent observed Australian climate change Temperature

Annual mean temperature anomaly - Australia (1910-2017)

Mean temperature anomaly ($^{\circ}\text{C}$)



Temperature trend 1910-2015

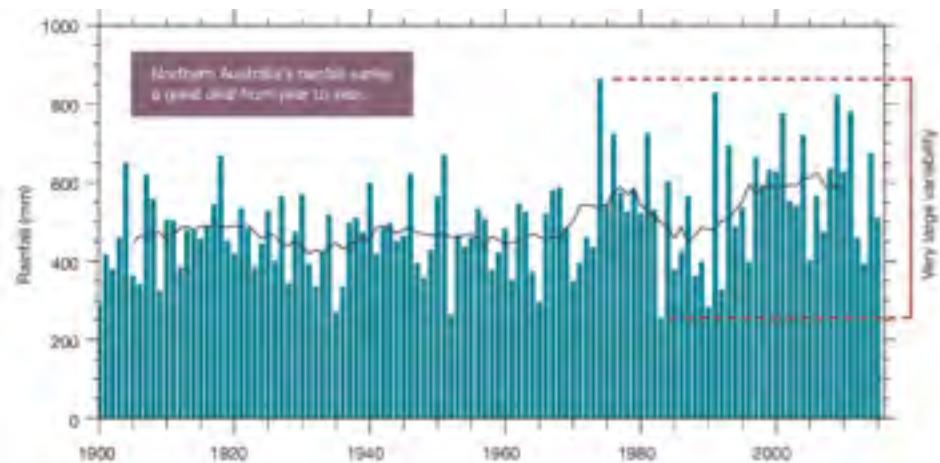


CSIRO/BoM State
of the Climate, 2016

Australia's mean temperature has
warmed by around 1°C since 1910.

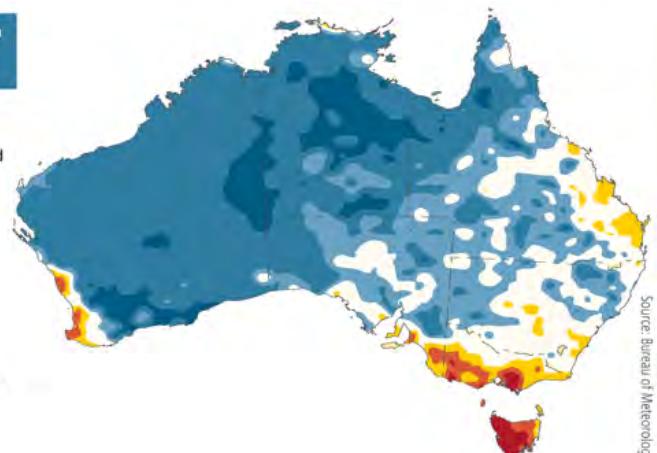
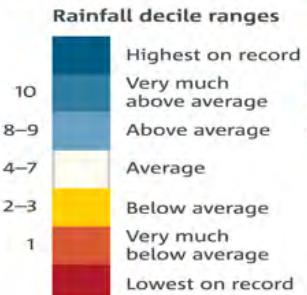
Recent observed Australian climate change Rainfall

Summer rainfall Northern Australia 1900-2015



Oct-April rainfall 1996-2015

Rainfall during the northern wet season has been very much above average.

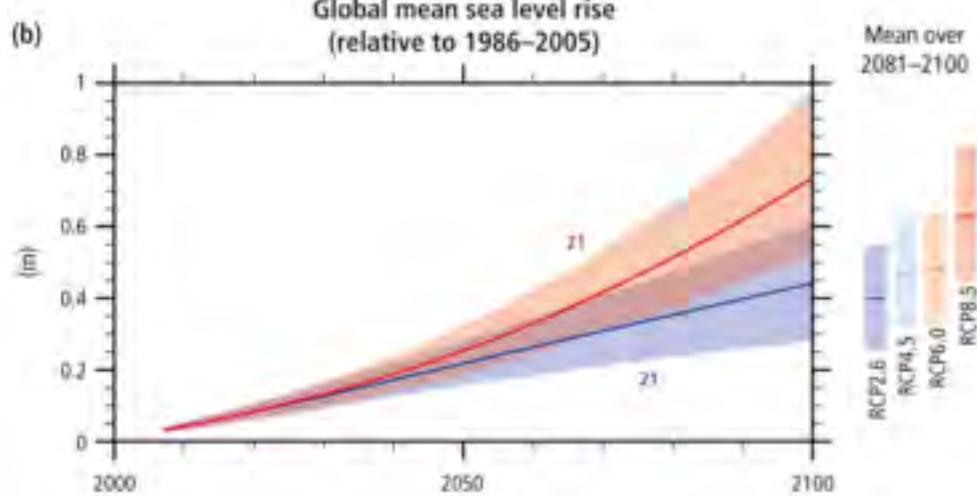
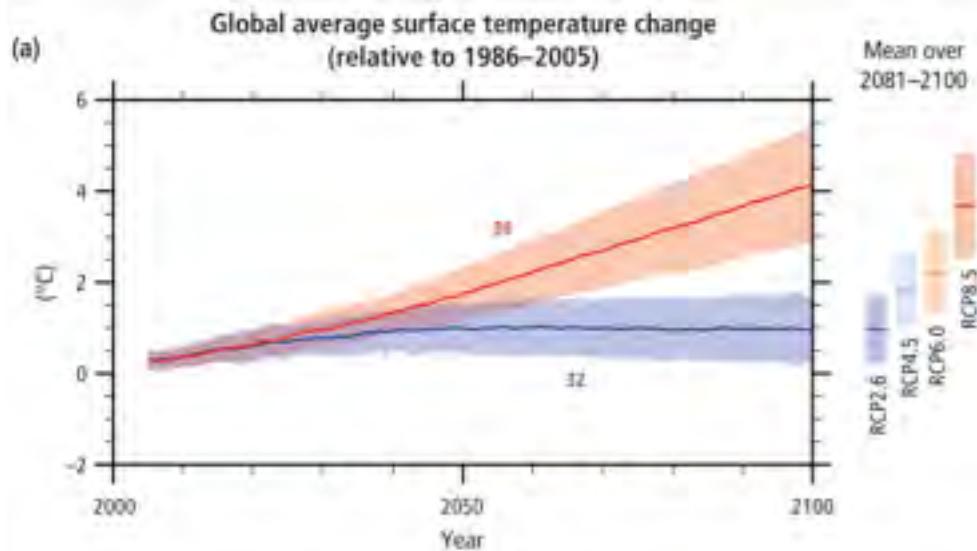


CSIRO/BoM State
of the Climate, 2016

Future global climate change

Two paths for global warming, depending on emissions.

Very low emissions gives >50% chance of warming less than 2°C



Sea level rise in 2050: ~15-35cm above 1995 levels

Continues to rise for centuries after surface temperature stabilises

Fig SPM.6, IPCC AR5 Synthesis Report

Projected climate change in Northern Australia



- Average temperatures will continue to increase in all seasons
- More hot days and warm spells



- Changes in average rainfall are possible, but uncertain; large decreases are less likely than increases or little change
- Increased intensity of extreme daily rainfall events



- Mean sea level will continue to rise. Height of extreme sea level will also increase



- Fewer but more intense tropical cyclones



Implications for Northern Australia

- Rainfall-sensitive industries in Northern Australia need to include the possibility of both increases and decreases in future average rainfall.
- Further warming, more temperature extremes and sea-level rises over Northern Australia are virtually certain
- Climate change has wide-ranging impacts, so needs to be considered as an integral part of a risk analysis in decisions about Northern Australia

What can you do?

- Factor information from climate change science into planning and policy decisions
- Prepare for the consequences that are inevitable – good and bad – to reduce threats and be ready for opportunities
- Talk to us about the information you need and how we can help



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FOR MORE INFORMATION

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The Earth Systems and Climate Change Hub is funded by the Australian Government's National Environmental Science Program,
with co-investment from the following partner agencies



Australian
National
University



MONASH
University



THE UNIVERSITY OF
MELBOURNE



UNSW
SYDNEY



NESP Northern Australia Environmental Resources Hub



Michael Douglas, Hub Leader



World-class research to support sustainable development



- \$23.8m over 6 years
- 75 researchers
- 25 projects
- 3 development regions



World-class research to support sustainable development

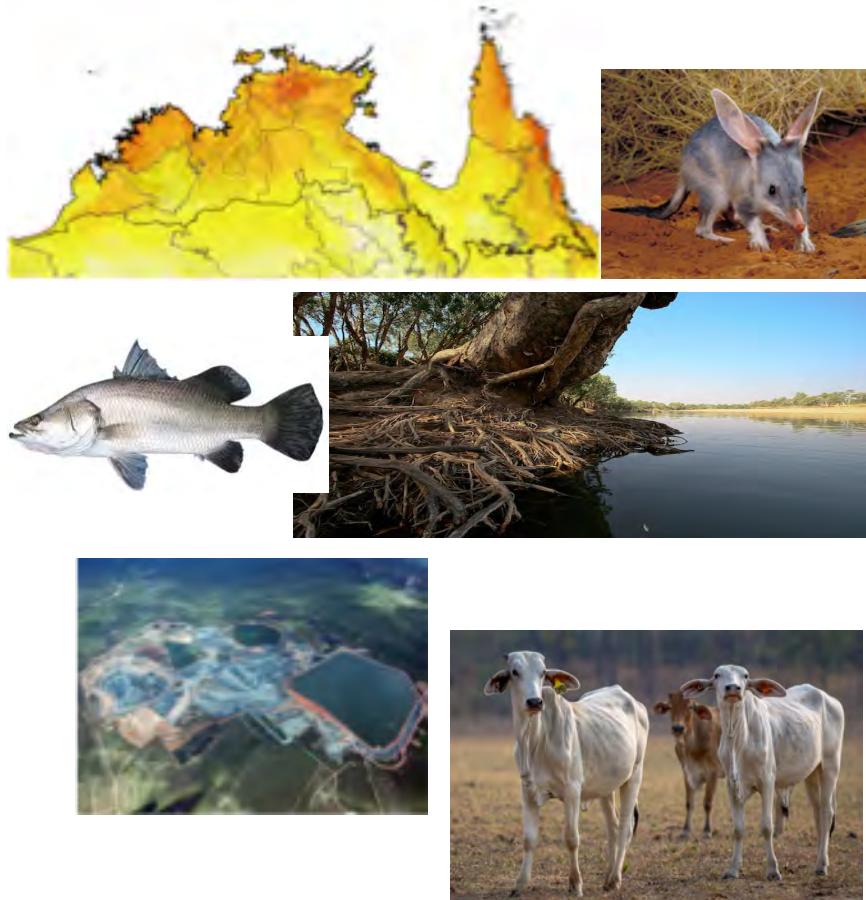
1. De-risking conventional economic development
2. Supporting alternative economic opportunities
3. Evaluating future development scenarios



World-class research to support sustainable development in northern Australia

1. De-risking conventional economic developments

- Mapping threatened species
- Environmental and Indigenous water requirements
- Minesite rehabilitation
- Sustainable grazing guidelines



2. Supporting alternative economic opportunities

- Fire and the carbon economy
 - Weeds and savanna methodology
 - Sequestration
 - Soil carbon
- Indigenous land management
 - Economic benefits
 - Social benefits
 - Impact investment



3. Evaluating future development scenarios: catchment scale

- Planning for multiple objectives
- Benefits and trade-offs



This work is supported through funding from the
Australian Government's National Environmental Science Program

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IMAGE: DILETTANTIQUITY, FLICKR.COM

NESP Threatened Species Recovery Hub

Professor Brendan Wintle, Director

Threatened Species Recovery Hub

The TSR Hub aims to provide research and knowledge that will help land managers and policy makers recover threatened species and prevent extinctions

- TSR Hub – total \$60M over 6 years
- 185 staff and researchers
- Over 120 projects



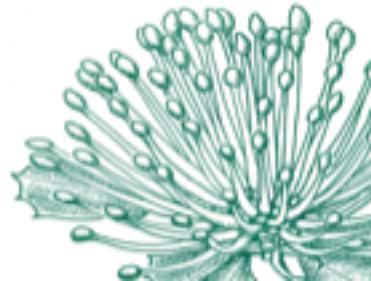
Impossible without partnership

National coverage:

1.1	4.0%
1.12	6.1
6.2	6.2
2.3	6.3
2.4	6.3%
3.1	6.3%
3.17	6.4

126 Partner Organisations

Not Shown
Macquarie Island
Christmas Island
Norfolk Island
Lord Howe Island
Other Islands



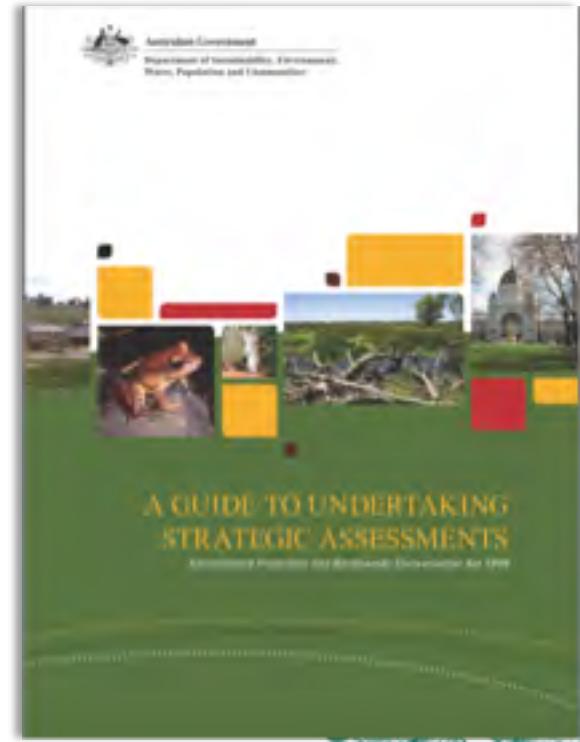
Developing Northern Australia

- Tourism and Natural Capital
- Indigenous land management and IPAs
- Regulatory constraints
- Invasive species



Strategic Assessment

- Reducing the administrative burden
- Avoiding death by a thousand cuts
- Providing longer term security
- Avoiding nasty surprises
- Multi-sectoral



Perth-Peel Strategic Assessment



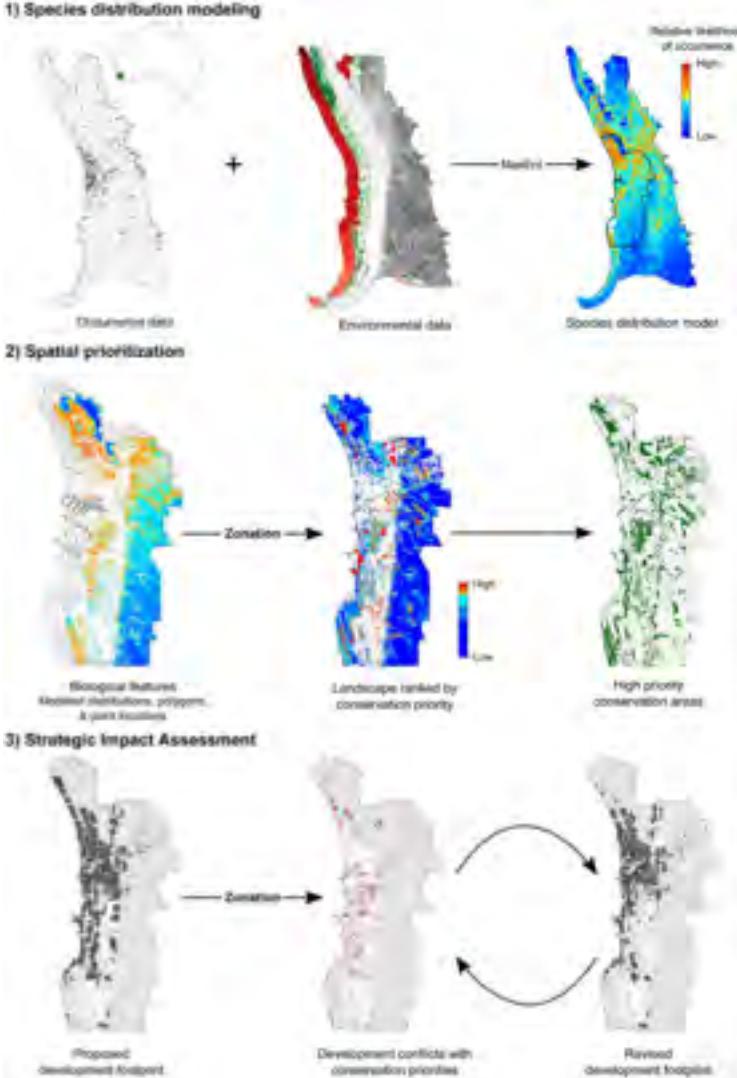
Conservation Letters

A journal of the Society for Conservation Biology

LETTER

Dealing with Cumulative Biodiversity Impacts in Strategic Environmental Assessment: A New Frontier for Conservation Planning

Amy L. Whitehead*, Helen Rajani, & Brendan A. Wintle

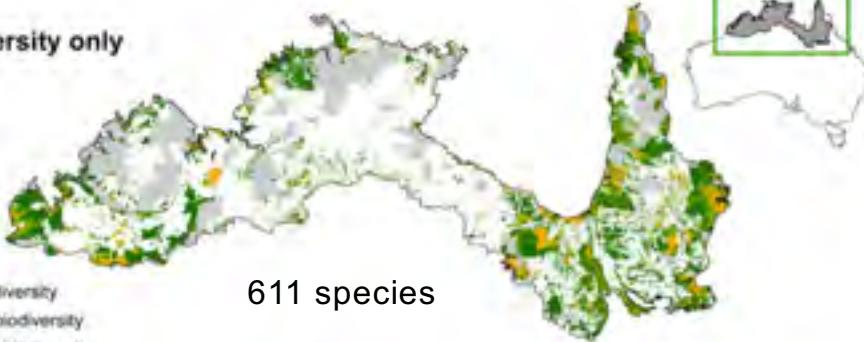




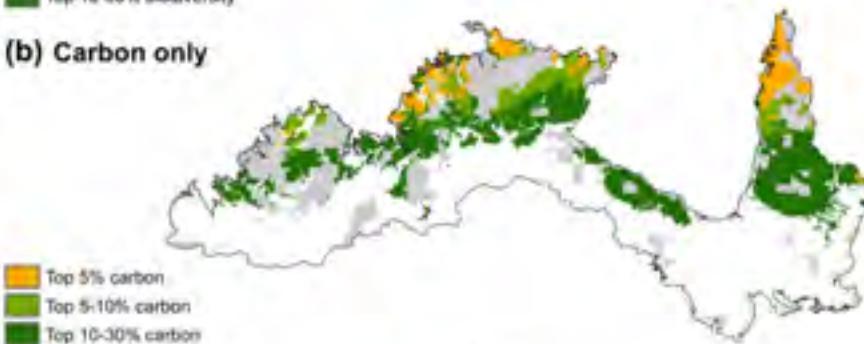
Threatened
Species
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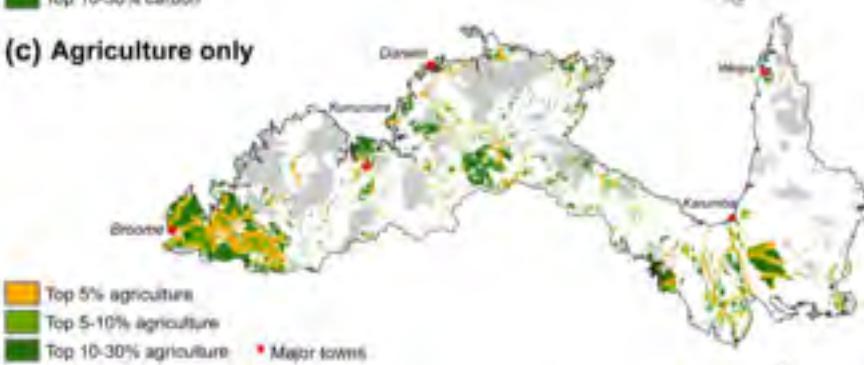
(a) Biodiversity only



(b) Carbon only



(c) Agriculture only



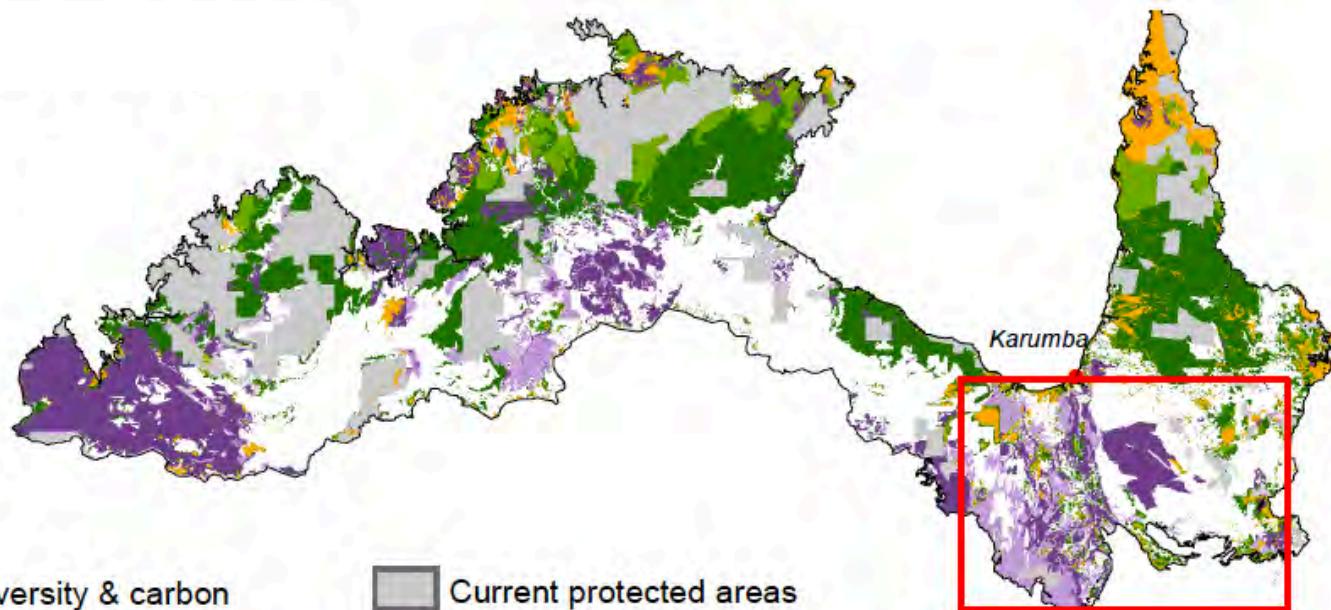
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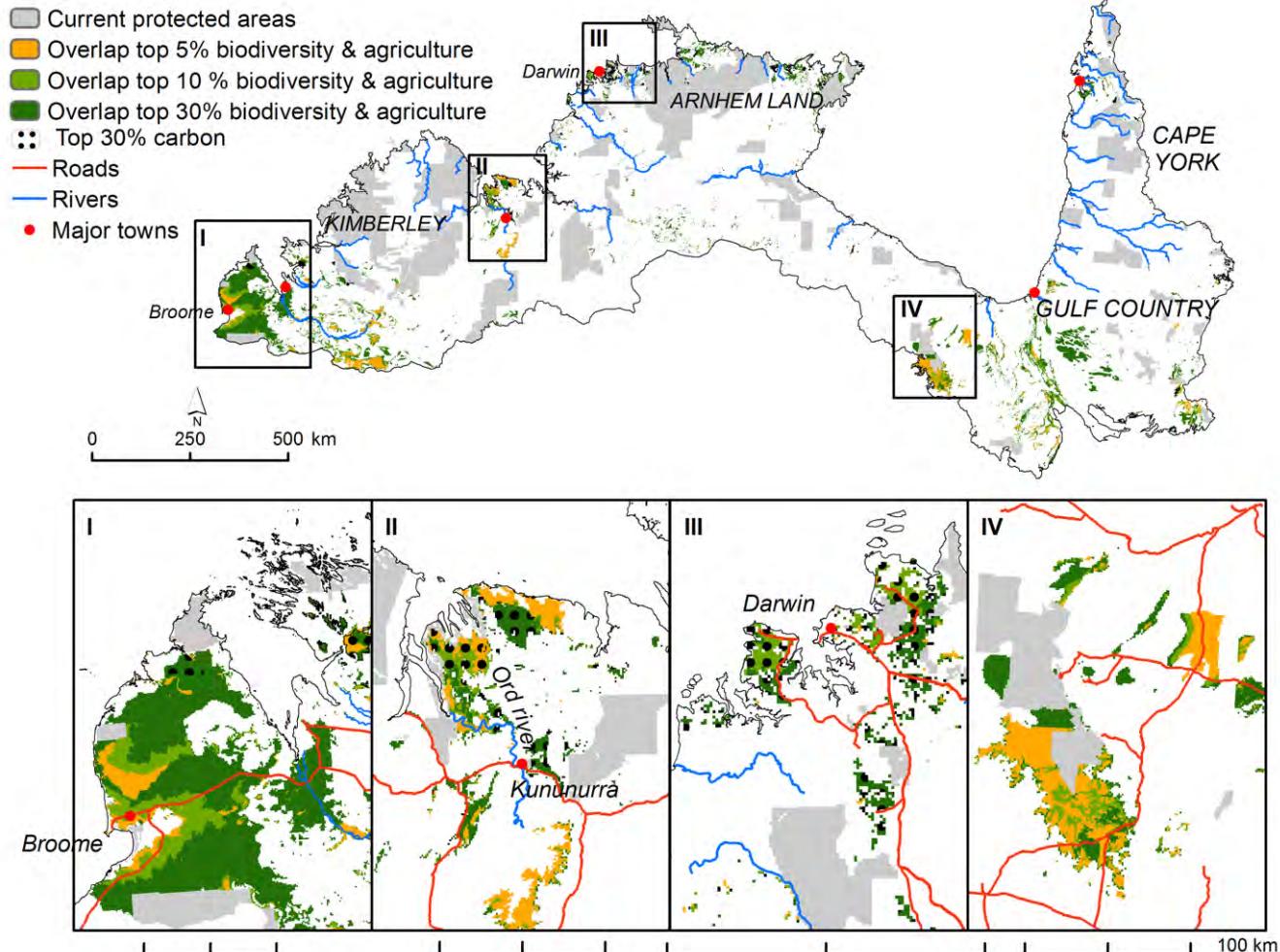
LETTER

Analysis of Trade-Offs Between Biodiversity, Carbon Farming and Agricultural Development in Northern Australia Reveals the Benefits of Strategic Planning

Alejandra Morán-Ordoñez^{1,2}, Amy L Whitehead¹, Gary W Luck¹, Garry D Cade², Ramona Maggini², James A Fitzsimons^{2,3}, & Brendan A Wintle¹



- Top 5% biodiversity & carbon
- Top 5-10% biodiversity and carbon
- Top 10-30% biodiversity and carbon
- Current protected areas
- Bottom 20% biodiversity and carbon
- Suitable soils for agriculture within bottom 20%



Key messages

- Incorporate biodiversity early – avoid surprises and conflicts
- Consider all impacts together – multi-sectoral approach
- Maximise certainty

