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## **Farming in northern Australia, where annual droughts, floods, fires & storms are guaranteed**

ANDREW CAMPBELL

Contributed presentation at the 60th AARES Annual Conference,  
Canberra, ACT, 2-5 February 2016

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**Farming in northern Australia, where annual droughts, floods, fires & storms are guaranteed**

**ANDREW CAMPBELL**

**AARES Canberra, 2 February 2016**

**Research Institute  
for the Environment  
and Livelihoods**



**<http://riel.cdu.edu.au>**

# Key Points

- There is scope to increase food production in northern Australia and to develop new export opportunities
- There is even more scope to improve regional food security
- In particular, we need smarter water policy & management tailored for this distinctive context
- ‘Drought Policy’ is not really a thing in the North, but water mythology abounds
- Key policy challenges and associated science and research priorities

## Myths and competing visions

- Terra Nullius — vast, empty, ‘unused’ country
- Vast pristine wilderness
- 60% of Australia’s water ‘going to waste’
- A potential food bowl for the emerging middle class of China and SE Asia
- Boom economy based on resources sector & mega projects

# European Dreaming

*“I could not refrain from breathing a prayer that ere long the now level horizon would be broken by a succession of tapering spires rising from the many Christian hamlets that must ultimately stud this country”*

John Lort Stokes 1846

# European Dreaming 2

*“I have no hesitation in saying that the country I have discovered on and around the banks of the Adelaide River [near present-day Darwin] is more favourable than any other part of the continent ... I feel confident that, in a few years, it will become one of the brightest gems in the British crown”*

John McDougall Stuart 1865

# European Dreaming 3

*“Only eight days’ steam from our Northern Territory there lies the great seething cauldron of the East, boiling over with parti-coloured humanity—brown and yellow men by the million, and they are quite near enough to us to do a lot of harm if their ideas run that way...Furthermore, our Northern Territory, practically uninhabited by whites, is just the place to suit these people. On those great sweltering, steaming, fever-laden plains, where the muddy rivers struggle slowly to the sea, the Orientals are in their glory. If they once get a footing there, they will out-breed and out-multiply any European race.”*

A.B. (Banjo) Paterson, *Sydney Morning Herald*, 1901



# European Dreaming 4

*“It is difficult to guess, but the area [from Gove to Katherine to Broome] when developed should be able to provide a reasonable plane of nutrition for up to ten million people. For this reason, Australia is likely to come under increasing pressure to develop it or hand it over to some agency which will provide the necessary capital.”*

Dr A.J. Millington  
WA Office of Regional Administration 1977

# European Dreaming 5

*“the committee’s work reflected the optimism of the time and the prevailing views ... that growth was a good thing, that it could be achieved primarily by seeking to impose on the North a way of life essentially European in its origin....*

*There is little evidence... of a genuine understanding of, or an intuitive sympathy with, the climatic and territorial environments of the North. We were southerners, and Europeans, and never really got over the sense of being in a somewhat alien and hostile environment... There was an almost complete disregard for the character and potential of the natural flora and fauna... growth was fundamentally to be based on extractive and exploitative techniques ... It is this lack, not merely in the work of the committee, but in the thinking about developments by me and my colleagues and the generation to which we belonged, which in retrospect is so disappointing.”*

H.C. (Nugget) Coombs 1977  
reflecting on the North Australia Development Committee 1946-48

# European Dreaming 6

*“Northern Australia’s proximity to the Asian and tropical regions provides unparalleled economic opportunity for the nation. Northern Australia should no longer be seen as the last frontier: it is, in fact, the next frontier.*

*The Government is determined to put in place the policies and plans that will lay the right foundation for long term growth.*

*Northern Australia has existing strengths and natural advantages in agriculture, resources and energy and, with the right policy settings, can expand opportunities in tourism, education and health services... ”*

The Hon Tony Abbott, Prime Minister  
The Hon Warren Truss, Deputy Prime Minister  
Green Paper on Developing Northern Australia, July 2014



# The opportunity

- It's not true that 60% of Australia's run-off is currently 'going to waste'
  - All water is currently 'used', just not all consumptively
  - Any diversion or increased extraction has some impact, somewhere
- That said, notwithstanding Bruce Davidson, there is considerable scope to increase food, fibre and energy production in northern Australia
- While sustaining the values that make this place so special
- And huge potential to sell our knowledge, technologies and services in neighbouring countries

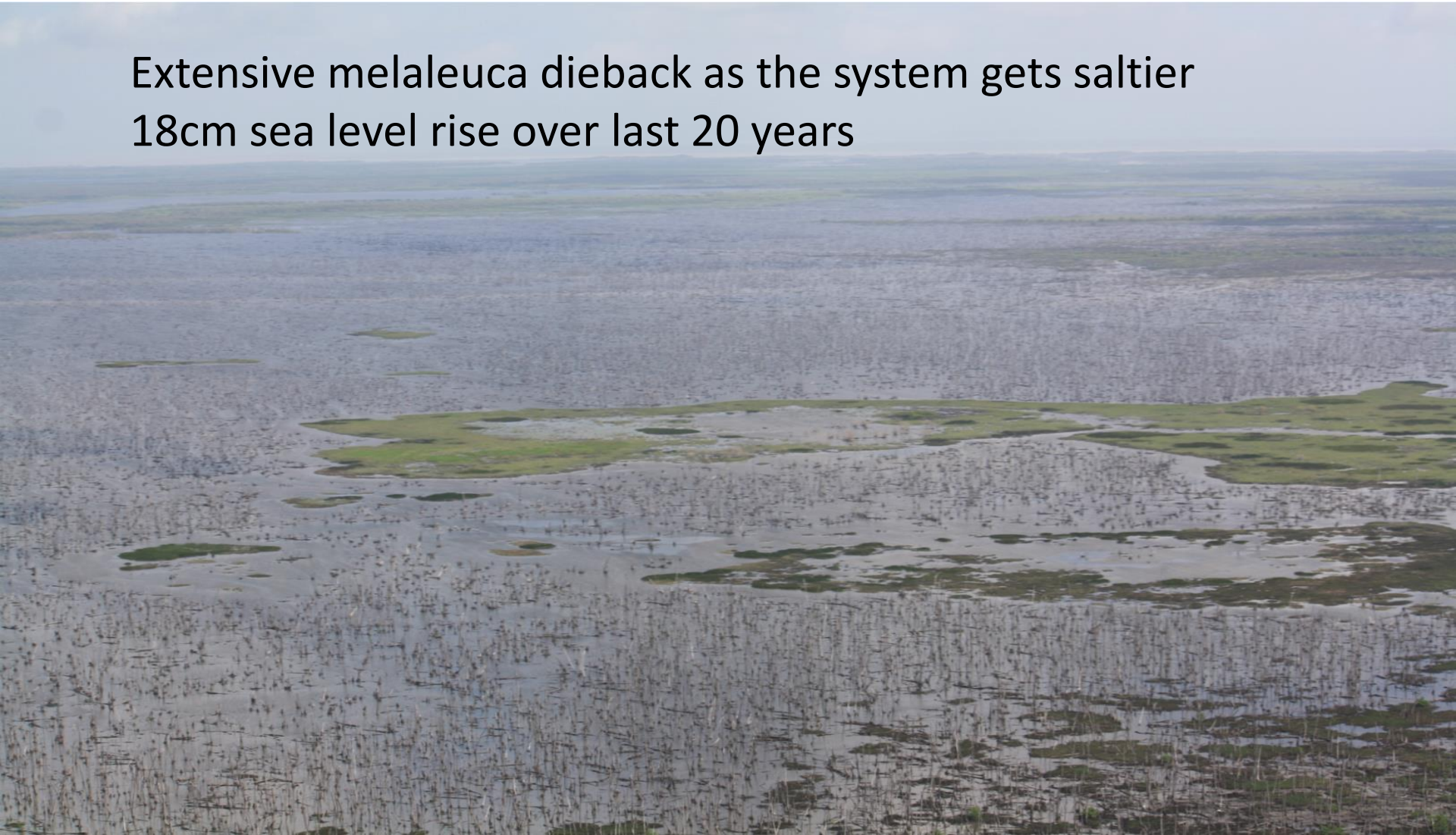
## IF:

- We apply what we already know intelligently; and
- We invest strategically in local science & capacity

# **The Mary River, NT**

## **floodplains affected by rising sea levels**

Extensive melaleuca dieback as the system gets saltier  
18cm sea level rise over last 20 years



Tommycut hypersaline mud flats were once fresh water wetlands



# Opportunities for irrigation in the north

- North Australia Land & Water Task Force suggested potential for 20,000 – 40,000 hectares of new irrigation
- Probably groundwater-based, distributed in 'mosaic' irrigation systems (see CSIRO Northern Irrigation Futures project)
- Scope for integration with cattle to increase feed supply & quality

## My take:

- OK, but off-farm, industry-level constraints (markets, transport, processing, marketing, labour, energy) equally important as agronomic and environmental challenges
- Significant opportunities to expand/intensify existing sites (e.g. Burdekin, Ord, Lockyer, Darling Downs and peri-urban areas)
- Major opportunities next door in neighbouring countries



# Constraints to irrigated agriculture in the north



- Despite popular perceptions, these systems are water-limited – evaporation exceeds rainfall, dry season is long and difficult
- Soils are generally ancient, weathered, low nutrient status, poor resilience to impact or disturbance
- Given climatic extremes, erosion and soil loss potential can be very high on even gently sloping sites
- Pest and disease problems can be very significant
- Input and transport costs are much higher than in the south
- Labour is more difficult to attract and keep
- Processing and marketing infrastructure is limited
- Markets are distant, supply chains vulnerable

# Environmental Imperatives

A photograph of two people wading through a river with rapids. They are wearing waders and hats, and appear to be engaged in a field activity, possibly fishing or environmental monitoring. The river is turbulent with white water, and the banks are rocky and vegetated.

- The unregulated rivers of northern Australia are globally significant
- Freshwater ecosystems are the most threatened globally
- Changing flow regimes is the biggest threat to tropical rivers
- Many fish & prawn species are euryhaline – spend parts of their lifecycle in sea and rivers, often far upstream (inland)
- Most productivity is on the floodplain, not in the river channel
- Aboriginal people still rely on wild-harvested freshwater species
- As do recreational fishers!
- Groundwater & surface water systems are connected
- Extraction needs to be based on good systems understanding
- This means serious investment in monitoring & modelling

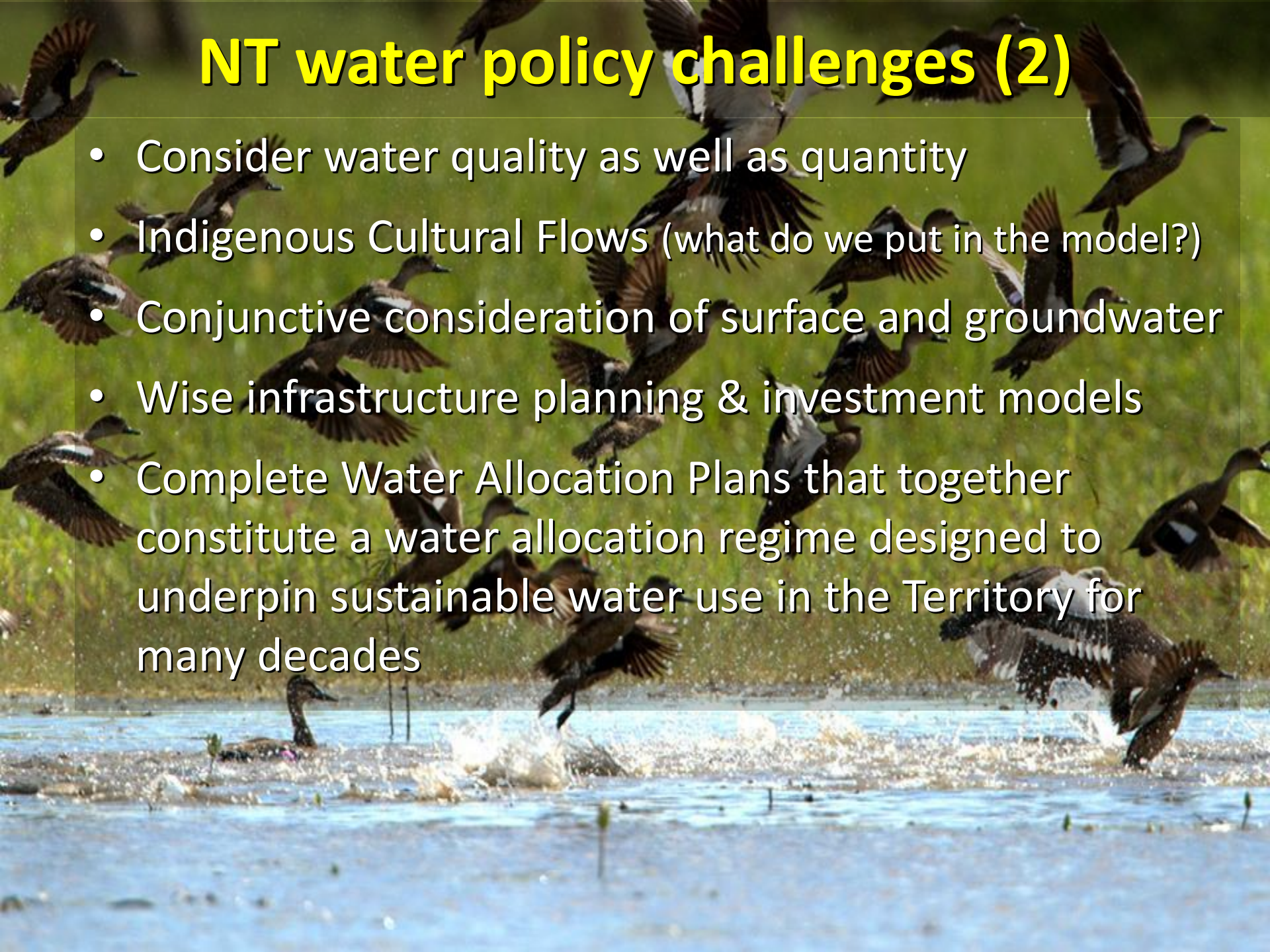
# NT water policy challenges (1)

- Give effect to agreed National Water Initiative principles
- Reconcile & provide for competing water uses
  - Environmental (allowing for future climates)
  - Indigenous
  - Minerals, oil and gas (conventional and unconventional)
  - Existing agricultural and horticultural enterprises
  - New agriculture, horticulture, forestry (and aquaculture?) developments
- Respond adroitly to the Northern Australian Development White Paper



# NT water policy challenges (2)

- Consider water quality as well as quantity
- Indigenous Cultural Flows (what do we put in the model?)
- Conjunctive consideration of surface and groundwater
- Wise infrastructure planning & investment models
- Complete Water Allocation Plans that together constitute a water allocation regime designed to underpin sustainable water use in the Territory for many decades





# Mega projects require new thinking

- Multi-decadal, multi-billion dollar projects have a large footprint in space, time and economic activity/displacement
- They usually have significant legacy implications
  - Environmental, Economic and Social
  - Downstream impacts, tailings dam releases
  - Bio-accumulation of metals
- Poor track record in anticipating and managing such legacies
- We need new (more ‘joined-up’) thinking around:
  - Planning and approvals processes
  - The distribution and ownership of risk through time (insurance?)
  - Taxation & royalty regimes
  - Offsets principles, policies and practices
  - Long-term independent monitoring systems (who does, who pays?)

## Robust regulation rests on good science & monitoring

*“... in order to win community confidence, truly independent monitoring will need to be undertaken by government or other agencies and/or credible research bodies. Induced seismicity, aquifer contamination, landscape and ecosystem fragmentation, greenhouse and other emissions to the atmosphere, together with potentially adverse social impacts...will need to be monitored and... baseline surveys will be required. ...monitoring will need to be carefully and cost effectively targeted to answer specific questions and transparently address particular concerns. This will require a robust regulatory regime ...which will also fully take account of the need for sensible and multiple land use, based around well-resourced regional planning and cumulative risk assessment.”*



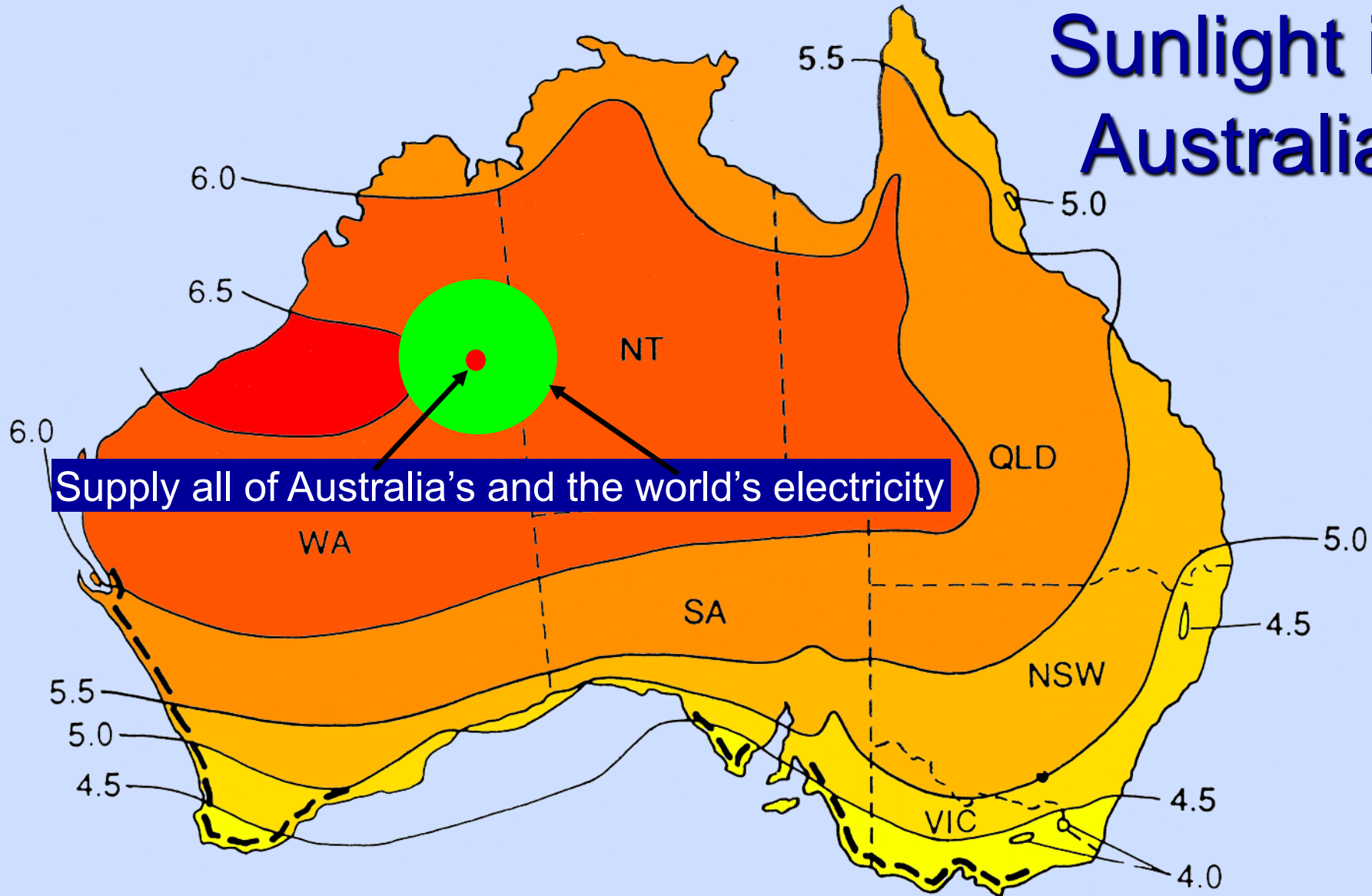
## Opportunities identified in the Green Paper

- The rise of Asia
- Global energy markets
- Strategic importance of regional security, biosecurity & border protection
- Technology and innovation
- Education, research and skills
- Economic diversification beyond minerals and energy
- Indigenous economic development leveraging culture, know-how and land
- Natural resources and landscapes provide opportunities for agriculture, tourism, mining and other industries, & communities

## So what is our role in feeding the region?

- We now feed directly about 60 million (<1%) people out of 7,000 million
- We indirectly help food supply for 400-500m people through Ag aid
- High \$AUD means poor people can't afford to buy our stuff anyway
- Don't conflate export income in market niches with feeding the world
- **Our most prospective export is between our ears**
  - Resilient, efficient food systems for variable & dry climates
  - Know how for climate variability & improving water productivity
  - Social innovations like Landcare and water governance lessons
  - Risk, resilience & response planning around disasters & extreme events
  - Tropical and remote health systems and services
  - Renewable energy and off-grid & remote systems know-how

# Sunlight in Australia



Supply all of Australia's and the world's electricity

4.5 — average solar radiation ( $\text{kWh/m}^2/\text{day}^{-1}$ )

--- prime areas of wind energy potential



# A Snowy Scheme for the 21<sup>st</sup> Century?

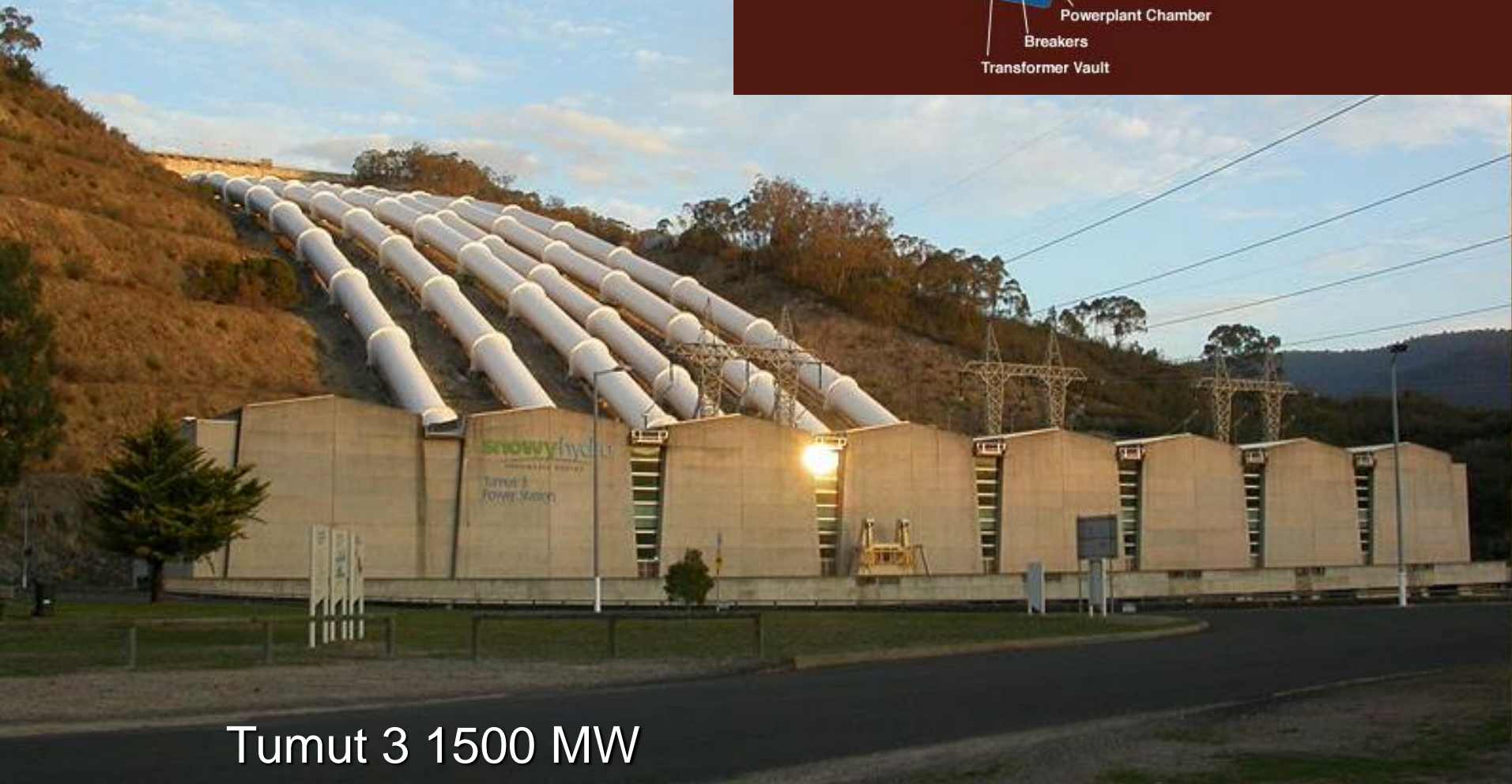
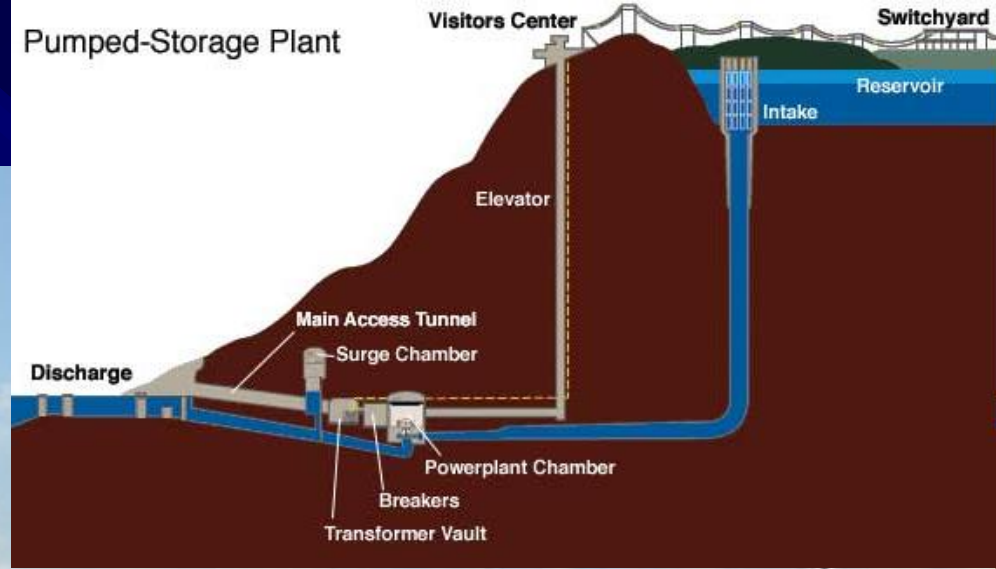




Lake  
Argyle



# Pumped hydro



Tumut 3 1500 MW

# A south-east Asian Supergrid?



# through the microscope

An aerial photograph of a tropical river landscape. The river winds through a dense, lush green forest. The water is a clear, light blue-green color. The surrounding land is covered in thick vegetation, with some areas appearing more open or cleared. The overall scene is vibrant and natural.

- Yes we can develop northern Australia
- There are amazing opportunities, but we need to move beyond boom-bust 19<sup>th</sup> Century thinking based on unprocessed commodities
- We can build a distinctive services-based economy built on extraordinary natural and cultural capital, and know-how for the tropics and challenging environments
- Darwin can be a dynamic southern knowledge centre for the fastest growing region of the world
- CRC building on the GrowNORTH consortium would be a good start



# For more info

*e.g. Paddock to Plate  
Managing Australian Soils  
Managing Australian Landscapes in a Changing Climate  
Powerful Choices  
The Getting of Knowledge*

<http://riel.cdu.edu.au>

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