Opportunities and Conflict in Agriculture and NRM in the Australian Tropics

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“A FOOD SECURE WORLD: Challenging Choices for our North”
The Crawford Fund 2011 State Parliamentary Conference
Parliament House, Brisbane
April 6, 2011
Key Points

1. Large natural resource base (soils, water, biodiversity)

2. Scope for future agricultural development is contested

3. Even so, is there adequate Northern R&D capacity in production agriculture?
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1. Large natural resource base (soils, water, biodiversity)
   • A brief overview

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TROPICAL AUSTRALIA
Huge area, low population density

Timor (3000K) 0.037m km²

Many shared biophysical / climatic / ecological features

Area: 42% (3.23m km²)
Population: < 5% (< 1 million)
SEASONALLY ARID MONSOONAL CLIMATE
Tropical savanna woodland - grassland – desert ecosystems

Mean Annual Rainfall
1961-1990

Millimetres

Mean monthly rainfall Townsville

Savanna woodland

Savanna grassland

Desert grassland / Desert

Wet tropics

800 mm

400 mm
Northern catchments carry c. 65% of the Continent's run-off.

MOST RAIN DELIVERED BY MONSOONAL LOWS & CYCLONES
Large spatial & temporal variation

Tropical Cyclone Tracks 1961-1990

Townsville
Wet season rainfall
(last 15 years)
LANDSCAPES & SOILS
Ancient, highly weathered, uneven topography

- Highly fragmented soil mosaics
- Generally low fertility, low C
- Fragile (i.e. erosion susceptible on disturbance)

- Even so, large areas are potentially arable, given water ...

“Crop production in northern Australia is limited by water, not soil…”
(North Australia Land & Water Science Report 2009)
MANY UNIQUE, IN SOME CASES ICONIC FEATURES
National & International Conservation Value

• Landscapes
• Ecosystems
• Artefacts
• Species

The basis for the agriculture vs natural environment schism
BIODIVERSITY RELEVANT TO AGRICULTURE
National & International Significance

Wild Relatives of Cultivated Crops

Australian Vigna spp
Secondary centre of diversity for wild mungbean

Germplasm storage in line with International Treaty obligations is a national challenge

“Much of this biodiversity is new to science …”
Key Points

1. Large natural resource base (soils, water, biodiversity)

2. Scope for future agricultural development is contested
   • Competing values – development vs natural environment
   • Mixed record of past experience

3. Even so, is there adequate Northern R&D capacity in production agriculture?
COMPETING COMMUNITY VALUES
Development vs Natural Environment

"Develop the North"

The target is "Sustainability"

"Save our Northern wilderness"

Industry Sustainability

The greening of agriculture

Environmental Sustainability

Public policy seeks to balance competing economic, environmental and social agendas

Historical position where public policy promoted development

Economic incentives for development complemented with / replaced by regulatory frameworks circumscribing development (Vegetation clearing, Environmental flows, Wild rivers, Reef protection)

Anti-development position
AGRICULTURAL DEVELOPMENT TO DATE
Mixed success with remote developments

Reasons for initial failures:

- **High cost structure** (remoteness, lack of markets, infrastructure, centralised admin.)
- **Unsuitable technology** (imported from south)
  - Massive issues due to highly variable rainfall, difficult soils, biotic challenges
  - R&D played ‘catch-up’ - solutions often delivered after the event

**Proponents of Northern Development point to the ultimate successes**

**Opponents focus on the initial failures...**
ESTIMATES OF NORTHERN POTENTIAL HAVE CONTRACTED
Especially for irrigation

<table>
<thead>
<tr>
<th>Pre-1980s Projects</th>
<th>ha</th>
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<tbody>
<tr>
<td>Territory Rice</td>
<td>200,000</td>
</tr>
<tr>
<td>Ord River</td>
<td>72,000</td>
</tr>
<tr>
<td>Lakeland (partial)</td>
<td>6,000</td>
</tr>
</tbody>
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**CSIRO Land Research (1960-1970)**

<table>
<thead>
<tr>
<th>Region</th>
<th>Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Kimberley</td>
<td>At least 80,000</td>
</tr>
<tr>
<td>West Kimberley</td>
<td>“Excellent dam sites”</td>
</tr>
</tbody>
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**National Land & Water Audit (2001)**

<table>
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<tr>
<th>Resource Type</th>
<th>Potential</th>
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<tbody>
<tr>
<td>Surface water (NT alone)</td>
<td>107,000</td>
</tr>
<tr>
<td>Groundwater (NT alone)</td>
<td>27,500</td>
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</tbody>
</table>

**Northern Australia Land & Water Science Review (2009)**

<table>
<thead>
<tr>
<th>Region</th>
<th>Potential</th>
</tr>
</thead>
<tbody>
<tr>
<td>All northern Australia</td>
<td>60,000 perhaps up to 120,000</td>
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Mainly groundwater (“No more dams”)

**Drivers for the downgrades on earlier optimistic assessments:**

- Early adverse development experiences
- More detailed knowledge of the resource base
- Assessments of possible environmental impacts factored in
- Strong sensitivity to past mistakes in southern Australia
  - Over-allocation, extensive clearing, degradation, salinity
Key Points

1. Large natural resource base (soils, water, biodiversity)
   • A brief overview

2. Scope for future agricultural development is contested
   • Past experience
   • Competing values – development vs natural environment

3. Even so, is there adequate Northern R&D capacity in production agriculture?
   • Capacity in crop & pasture science in the North has collapsed
   • The Brazilian Cerrado: A case study on what can be achieved with R&D
Lessons from the past
- R&D needs to be proactive, not ‘catch-up’
- Systems R&D needs to be developed locally, not imported (Some elements transferable e.g. GM cotton varieties in the Ord)

Northern R&D in crop & pasture science has shrunk
- Much more than the downsize in regional potential

Does the North retain adequate R&D capacity?
- Or will the North once again be reliant on imported capacity or “fly in – fly out” science

“Our landscapes are remote but the relevant science is even remoter”
Noelene Gross, CEO Northern Gulf Resource Management Group, Outlook 2010
More favourable climate & terrain, but like the North:
- Natural vegetation is depauperate savanna
- Infertile soils (acidic oxisols)
- Early large-scale project failures (unsuitable 1970s USA technology)

Unlike the North:
- a massive sustained R&D effort (EMBRAPA)
- successful no-till cropping systems integrated w. livestock
- 50 m ha (→ 300 m ha)
- World’s #1 Food Exporting Nation (70% ex cerrado)

See “The Miracle of the Cerrado” The Economist, 28 August 2010
Thank You