



Australian Academy of Science

Submission to the Joint Select Committee on Northern Australia

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Summary

The Australian Academy of Science welcomes the opportunity to provide a submission to the Joint Select Committee on Northern Australia's inquiry into the future of Northern Australia. The Committee has stated it will recommend to Parliament the need for a white paper detailing the government action needed to be taken to implement the committee's other recommendationsⁱ, with the Coalition having already announced it intends to produce a White Paper on Northern Australiaⁱⁱ. The Academy is concerned that the current terms of reference for the inquiry are too limited in scope and do not give due regard to the important role of integrating scientific knowledge into any future plans for the development of Northern Australia.

Whilst there are a wealth of opportunities in Northern Australia, failing to utilise scientific knowledge will seriously hamper progress and runs the risk of causing damage to the environment as well as existing parts of the northern Australia economyⁱⁱⁱ. Northern Australia supports a diverse array of wildlife and is home to many endemic species. All of the area's wetlands are ecologically important, but also have significant cultural value, particularly to Indigenous people^{iv}.

On the surface, opportunities in northern Australia appear to be abundant, however it is important to recognise that northern Australia is not a vacant land, and has already been subject to economic development. It already has tourism, agriculture, fisheries, resources, and education industries. The Committee has stated that it wishes to examine the potential for further development of these and other industries. The expansion of any of these industries, and the broader expansion of the northern Australia economy will require an increased use of land and water resources.

Contrary to the popular discourse that there is much available water in northern Australia, the reality is the region is, in fact, 'water limited'. Approximately 1 million gegalitres of rainfall is received across the north of Australia each year, this being eight and half times the annual runoff in the Murray-Darling Basin. These large numbers have led to the mistaken perception that there is much fresh water going to waste that could be put to productive use. Despite high rainfall during the wet season (November to April) there is very limited rainfall during the other half of the year, with most rivers only flowing during the short wet season^v, and that rainfall can vary greatly between years^{vi}. Of this rainfall, only 20% enters rivers and streams, and about 15% recharges groundwater resources. Much of the rainfall occurs near the coasts and floodplains, and runs quickly out to sea, making it difficult to capture^{vii}. Relatively little rainfall occurs in the upper parts of river catchments where topography would be more favourable for possible dam construction, meaning that there are significant constraints on the viability of surface water storages^{viii}. The rest of the rainfall (65%) evaporates from the soil surface or is transpired by plants^{ix}.

Scientific evidence shows that available fresh water is not abundant in the context of total annual rainfall in the region, but that there is nevertheless scope for increased consumptive uses of water^x. The Northern Australian Land and Water Taskforce concluded that the development of groundwater resources provides the best prospect for such increased use, with a potential for approximately 600 gegalitres of groundwater to be available across northern Australia^{xi}. Two recent reports from CSIRO show that water capture and storage through dams in the Flinders and Gilbert area might provide a possible water source for agriculture, but that significant economic and environmental challenges would need to be overcome^{xii}. However in most areas throughout northern Australia the ecological

consequences of increased water extraction through flow changes or increased extraction from aquifers, are largely unknown^{xiii}.

Any sustained economic expansion in industries across northern Australia will only be successful if careful planning and management of land and water resources are adhered to, otherwise there is a risk of failure, and of causing damage to other parts of the northern Australia economy. Two recent reports by the Northern Australia Land and Water Taskforce, *Sustainable development of northern Australia*^{xiv}, and *Northern Australia Land and Water Science Review*^{xv}, as well as the recent research undertaken by CSIRO^{xvi} show that such activity is possible but that current knowledge gaps need to be identified and filled, and that scientific advice must be integrated into decision making processes. The Academy is concerned that the Committee's terms of reference do not explicitly recognise this point.

The Academy urges the Committee to consider in its recommendation for a white paper that:

- **adequate regard be given to learning from previous lessons of development in southern Australia.**
- **existing science and knowledge be incorporated into how we plan to manage resources in a sustainable way.**
- **gaps in existing knowledge be identified and a plan to undertake new scientific research to cover these gaps be developed.**

Applying existing knowledge

Learning from lessons learnt in the south

The reality of northern Australia is that the ability to conserve and access surface water for consumptive use is highly constrained. As a precious resource essential to all social, cultural, economic and environmental activity, water needs as much careful management as it requires in southern Australia. We know from experience with managing the Murray-Darling Basin water system, that water entitlements and unsustainable management practices are very hard to reverse. Lessons from the Murray-Darling show that whilst many developments are technically feasible, they are not necessarily cost effective or ecologically sustainable^{xvii}. Once entitlements have been granted, it is difficult to pull them back and change unsustainable management practices in the future. This situation must not be repeated in northern Australia. Integrating scientific advice, such as that being developed by CSIRO, at an early stage within land and water management practices in any attempt to expand industries in northern Australia will help ensure such mistakes are not repeated.

Learning from lessons in the north

There have been examples of irrigation and agriculture schemes in the north that have failed to deliver on their promised potential, for example the Ord irrigation scheme. It is important to learn from those past schemes, and to look for examples across the north which have promise. For example the CSIRO Northern Australia Irrigation Futures project^{xviii} has found that a patchwork mosaic of smaller-scale irrigation based on groundwater, in those areas that have better soils, might prove to be an effective way to develop new agriculture opportunities.^{xix}

Impact of agriculture on the tropical Australian landscape

The impact of agriculture on the tropical Australian landscape is not well understood. There have been a number of cases where extreme soil erosion and other degradation events have occurred in the north because of poorly planned or poorly understood agricultural practices^{xx}. We must learn

from these mistakes and ensure they are not repeated, otherwise there is risk of both economic failure and environmental degradation. Extreme soil erosion can lead to the economic failure of agricultural investments, and this could potentially discourage future investment in the region as well as causing long-term environmental problems.

Long-term effects of irrigation

Whilst humans have used irrigated land for thousands of years, they have rarely done so in a sustainable fashion. Over the long term, irrigation can lead to increased salt levels in soil, local waterlogging and nutrient depletion. It can also lead to degradation of the surrounding landscape as water is depleted^{xxi}. Existing scientific knowledge on the effects of irrigation need to be designed into any future irrigation activity to help reduce environmental impacts, and ensure that soils remain healthy, and agricultural activity remains feasible over the long-term. Recent CSIRO research shows that irrigating in the north during dry years will have a negative environmental impact^{xxii}. It is essential that this effect be better understood and scientific knowledge be used to help reduce or mitigate its impact.

The Academy recommends that land and water management lessons from economic development be appropriately applied to ensure future development leads to positive economic, environmental, social and cultural outcomes.

Knowledge gaps

Our current knowledge of water resources in northern Australia is limited, and tends to be focussed on the current urban and agricultural use of water. The Northern Australia Land and Water Taskforce highlights a number of areas where increased scientific knowledge is required. A lack of data and scientific knowledge in these areas are significant impediments to future growth plans, and represent an 'unknown' that could discourage private investment. Without efforts to expand our scientific knowledge in the following areas, the sustainable economic expansion of industries will be hampered, thereby running the risk of causing adverse economic, social, and environmental outcomes. Table 1 provides a non-exhaustive list of identified knowledge gaps where further scientific information is needed.

The Academy urges the Committee to ensure that the White Paper provides a clear plan to identify what scientific knowledge we currently have and how it can be best applied, and what scientific knowledge is needed, and how it can best be generated.

Scientific knowledge gaps in the northern Australia region
Environmental water requirements of groundwater ecosystems
The complex interaction between surface and groundwater systems critical to the operation of the landscape
Climate, water, land and environment data collection and analysis to support land and water use planning, and local decision making
Comprehensive geophysical survey data quantifying groundwater resources and salinity risks
Social, cultural, and economic analyses to support the assessment of competing values and uses for land and water use planning, catchment level water planning and local decision making
Data fully quantifying what water is available for consumptive use across different catchments. And, where water catchment data is available, details on the cost effectiveness of investments to capture and store surface water for consumptive uses
An assessment of groundwater provinces and their interconnection with surface water
The benefits and impacts of mosaic agriculture
Long term and appropriate levels of monitoring of soil conditions are required to help to identify impacts of land degradation processes such as land clearing and irrigation, and therefore providing an opportunity for early intervention and adjustment of land management practices
River flow assessments to be undertaken before new developments begin, assessing in detail long-term baseline ecological data
Data on how much water is needed to support the environmental needs of waterways and groundwater
Substantial research and monitoring to provide planning data for most of the river basins in northern Australia

Table 1 Non-exhaustive list of scientific knowledge gaps in the northern Australia region. These knowledge gaps represent a barrier to future development

Conclusion

The Academy has highlighted just a few of the major issues that need to be taken into consideration when considering further economic development in northern Australia. For any development to succeed on both an economic and environmentally sustainable footing will require science to be integrated into the decision making process. The Academy would like to draw to the Committee’s attention the following reports to assist in this regard.

Notable reports of interest

CSIRO (2009) *Water in northern Australia. Summary of reports to the Australian Government from the CSIRO Northern Australia Sustainable Yields Project*. CSIRO: Australia.

Northern Australia Land and Water Taskforce (2009a) *Sustainable development of northern Australia*. Available at: <http://www.regional.gov.au/regional/ona/files/NLAW.pdf>

Northern Australia Land and Water Taskforce (2009b) *Northern Australia Land and Water Science Review: Chapter Summaries*. Available at: http://www.regional.gov.au/regional/ona/nalwt_files/337388_NLAW_Review_2009.pdf

Submission references

- ⁱ Joint Select Committee on Northern Australia (2013) *Terms of Reference*. Available at: http://www.aph.gov.au/parliamentary_business/committees/house_of_representatives_committees?url=jscna/tor.htm
- ⁱⁱ Liberal Party of Australia (2013) *2030 Vision for Developing Northern Australia*. Available at: <http://lpaweb-static.s3.amazonaws.com/Policies/NorthernAustralia.pdf>
- ⁱⁱⁱ CSIRO (2009a) *Water in northern Australia. Summary of reports to the Australian Government from the CSIRO Northern Australia Sustainable Yields Project*. CSIRO: Australia. Available at: http://www.csiro.au/~media/CSIROau/Flagships/Water%20for%20a%20Healthy%20Country%20Flagship/NASummary_WfHC_PDF%20Standard.pdf
- ^{iv} CSIRO (2009a)
- ^v CSIRO (2009a)
- ^{vi} CSIRO (2009a)
- ^{vii} Northern Australia Land and Water Taskforce (2009a) *Sustainable development of northern Australia*. Available at: <http://www.regional.gov.au/regional/ona/files/NLAW.pdf>
- ^{viii} CSIRO (2009a)
- ^{ix} Northern Australia Land and Water Taskforce (2009a)
- ^x Northern Australia Land and Water Taskforce (2009a)
- ^{xi} Northern Australia Land and Water Taskforce (2009b) *Northern Australia Land and Water Science Review: Chapter Summaries*. Available at: http://www.regional.gov.au/regional/ona/nalwt_files/337388_NLAW_Review_2009.pdf
- ^{xii} CSIRO (2014) *Flinders and Gilbert Agricultural Resource Assessment*. Available at: <http://www.csiro.au/fgara>
- ^{xiii} CSIRO (2009a)
- ^{xiv} Northern Australia Land and Water Taskforce (2009a)
- ^{xv} Northern Australia Land and Water Taskforce (2009b)
- ^{xvi} CSIRO (2014)
- ^{xvii} Northern Australia Land and Water Taskforce (2009a)
- ^{xviii} CSIRO (2009b) *Northern Australia Sustainable Yields*. Available at: http://www.csiro.au/~media/CSIROau/Flagships/Water%20for%20a%20Healthy%20Country%20Flagship/NASummarysheet_WfHC_PDF%20Standard.pdf
- ^{xix} Campbell, A. & Turner, J. (2013) *We need a smarter debate on developing northern Australia*. Available at: <https://theconversation.com/we-need-a-smarter-debate-on-developing-northern-australia-16846>
- ^{xx} Northern Australia Land and Water Taskforce (2009b)
- ^{xxi} Northern Australia Land and Water Taskforce (2009b)
- ^{xxii} CSIRO (2014)