

Strategic Analysis Paper

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Water Resource Management in Northern Australia

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Key Points

- The provision of adequate water resources is key to the economic development of northern Australia and while abundant supplies of fresh water exist in the north, the infrastructure to distribute it has yet to be realised.
- The history of water resource management in Australia is centred on the Murray-Darling basin in the country's south-east and other regions remain under researched.
- Successive government policies have focussed on the development potential for northern Australia, with focus given to irrigated agriculture as a driver of economic development.
- The potential for significant increases in irrigated agriculture in northern Australia is highly dependent on how water resources are managed now developed and into the future.

Summary

Just over half a century ago, agricultural economist Bruce Davidson published a book entitled *The Northern Myth* (1966). His statement from this book that 'Politicians, with the support of the press, have taken advantage of the peculiar fascination northern development has for the Australian public...'. The statement could be just as relevant in the current decade as it was at the time of original publication. Election campaigns enthusiastically declare the potential for northern Australia to be developed as '[a food bowl](#)' or as a reliable source of drinking water for dryer southern regions. Elected governments, however, have tried to [hit the brakes on overstated claims](#). In 2015, the federal government delivered a [white paper](#) into the development of northern Australia (Department of the Prime Minister and Cabinet Australia 2015), and part of

its policy was the launch of the five billion dollar Northern Australia Infrastructure Facility. Given the climate of northern Australia, hopes for development are mostly underpinned by access to water resources. But just how much development could northern Australia's water resources support? Why is there so much emphasis on irrigated agriculture (as opposed to dryland agriculture, or other industries) as a driver of development? What, if anything, is different now from Bruce Davidson's conclusion that '...unsubsidized intensive farming in tropical Australia would be unprofitable'? In this Strategic Analysis Paper, some context will be added to the discussion to help separate fact from populist political myths about the management and scope for development of northern Australia's water resources.

Analysis

Much of northern Australia receives a high annual rainfall. So much rainfall, in fact, that estimates are often related in terms of how many times you could fill either the Melbourne Cricket Ground (enough to fill it to an altitude of 80,000 feet; from the Department of Prime Minister and Cabinet in 2015) or sufficient to fill Sydney Harbour with fresh water 2000 times each year. But this rainfall is extremely seasonal (over 90% of it falls during the summer wet season), and is rarely reliable: as a result, most rivers and streams in northern Australia will only have intermittent flow.

The 2015 white paper, *Developing Northern Australia* outlined a vision that was based on rapid population growth in the region, from just over 1.3million at the time to 4-5million by 2060. Five industry 'pillars' were identified as having the most potential to drive this population growth: food and agribusiness, resources and energy, tourism and hospitality, international education, and healthcare, medical research and aged care. Of the five pillars, the first – food and agribusiness – is particularly dependent on water resource management: water use in the agricultural industry in Australia represents [nearly two-thirds of total consumption \(based on 2014-15 figures\)](#). The white paper stated that northern Australia contains up to 17 million hectares (ha) of soil potentially suited to irrigated agriculture, but only about ten per cent of this has sufficient access to water. As stated in the [2009 science review](#) by the Northern Australia Land and Water Taskforce (NALWT); 'Water, rather than soil, is the resource that limits irrigated agricultural development in northern Australia'. Irrigated agriculture has the potential not only for the direct production of food and fibre, but also as a method of [improving the productivity of beef production](#).

Why is water supply through irrigation crucial to agriculture in the north?

[The availability of water in northern Australia is key for the development of agriculture](#) due to the generally poor soils common in the region. These soils are highly weathered, and as such are low in organic carbon, water holding capacity and are highly erodible. The 2009 NALWT review estimated that while a typical crop in the southern half of Australia will require about five megalitres per hectare (ML/ha), a rule of thumb for the north is more like 15 ML/ha for one or two annual crops a year. In the 2015-16 financial year, the Australian Bureau of Statistics (ABS) reported [an average use throughout Australia of 3.9 ML/Ha for irrigated pastures and crops](#), and [an average use in the Murray-Darling basin only of around 4.1 ML/Ha](#). So, while the NALWT estimates might be considered conservative, they do underline a large increase in water requirement in northern Australia. This has a lot to do with the rates of [evaporation](#) and [evapotranspiration](#), which are significantly higher than what is seen in the south. As an example; in Kununurra, near the Ord River Irrigation Area in Western Australia, the annual average point

potential evapotranspiration is about 3,000mm – meaning that an irrigated field would need to have be supplied with an equivalent volume of water to three metres of rainfall every year just to make up for losses to the atmosphere. One of the largest dams north of the Tropic of Capricorn; the Ord river dam, loses about a [quarter of its storage capacity every year from evaporation](#). So, while surface water storage options may appear to solve the issue of inconsistent water flow, their viability is vastly reduced by the climate.

A short history of development initiatives

Within the last decade, there has been ongoing research into the development potential of ‘the north’. At first, the actual areas covered tended to vary depending on the sponsoring Department or organisation. The geographic definition ranged from everything north of the Tropic of Capricorn, [plus all of the Northern Territory](#), to just a select few ‘[drainage divisions](#)’ or Geoscience Australia’s [broader definition](#). Recently, however, the area above the Tropic of Capricorn plus the Northern Territory, for the purpose of northern Australian development, has been widely accepted.

In [mid-2007, the Howard government set up the NALWT](#), after [the severe drought](#) of the preceding year had intensified calls to improve water security. The taskforce was to identify opportunities for improving the sustainable consumption of water within the framework of the 2004 National Water Initiative (NWI) – [an agreement between states on water reform](#). Following the change of government in late 2007, the taskforce was re-established with some minor changes, and went on to deliver a report [on the sustainable development of northern Australia in December of 2009](#), with support from the (then) recently established [office of Northern Australia](#) and the [Commonwealth Scientific and Industrial Research Organisation \(CSIRO\)](#). In 2008, the Council of Australian Governments (COAG; the same body that had signed the NWI agreement in 2004) commissioned the CSIRO Northern Australia Sustainable Yields (NASY) project, which finished [reporting in 2009](#). The aim of the project was to assess the water resources of several drainage divisions in northern Australia. This project was also a basis for subsequent assessments with more focus on agricultural potential.

Water resource assessment

The CSIRO, who are also working on collaborative water resource management projects with [India](#), [Bangladesh](#) and [China](#), are in the process of assessing several major water resource area in northern Australia. In accordance with one of the stated goals of the 2015 white paper, the CSIRO was tasked with undertaking assessment work in northern Australia to reduce barriers to investment by addressing questions over land and water resource uncertainties. They are currently investigating the Fitzroy catchment in Western Australia, Darwin catchments in the Northern Territory and the Mitchell catchment in Queensland. The assessments are [due to be completed by June 2018, with overall goals to:](#)

1. evaluate soil and water resources,
2. identify and evaluate water capture and storage options,
3. identify and test the commercial viability of irrigated agricultural and aquaculture opportunities, and
4. to assess potential environmental, social and economic impacts and risks of water resource and irrigation development.

The CSIRO highlights that many existing irrigation schemes in the north had failed to live up to potential due to ‘...insufficient capital to overcome the failed years that inevitably accompany every new irrigation scheme’.

The 2013 Flinders and Gilbert Agricultural Resource Assessment, looking specifically at the Flinders and Gilbert River catchments in Queensland. This report found that this area had a [potential to irrigate up to 50,000 ha](#). This potential was still limited to just a majority of years (70-85%) due to climatic inconsistency. The reports also highlighted that commercial profit returns on investment into water development infrastructure would be unlikely. The report concluded that if water resource development were to go ahead in this region, the financial expenditure locally would be to the detriment of the national economy. The incorporation of irrigated forages for beef operations in the catchments was not likely to see sufficiently increased revenues to offset costs.

How much irrigated agriculture could northern Australia support?

The 2014 CSIRO report estimated that there were about 200,000 ha of irrigated agriculture north of (or close to, in the case of parts of the Fitzroy catchment in Queensland) the Tropic of Capricorn. This represents about eight per cent of Australian irrigated area – in contrast to the 1.2 million ha; or 50% of total, in the Murray-Darling basin. A [2015 Infrastructure Australia report](#) to support the subsequent government white paper estimated that 700,000 ha of irrigated agriculture would be needed to support a low population growth scenario modelled to 2031. The same report identified 470,000 ha of potential opportunities for irrigation-led development, whereas the 2009 NALWT science review stated that only about 60-120,000 ha would be possible based on available water. The [2014 CSIRO report](#) stated that 1.4 million ha of irrigated agriculture could be supported by the construction of around 90 dams or weirs (this figure does include existing irrigated area and its supporting infrastructure).

Water storage options

As there is insufficient year-round water flow in northern Australia, water storage is required. Traditional options to store water include dams (also called in-stream storage) or weirs and off-stream storage. In northern Australia there are [significant underground aquifer systems](#) that are currently used to supply water for a variety of uses. Some aquifers can also be used for water storage to improve the sustainability of water extraction, through a process known as [Managed Aquifer Recharge \(MAR\)](#) or [water banking](#), as is being done to [improve the reliability of one of Perth’s drinking water sources](#). Underground dams, a form of MAR, are common overseas and are being investigated by the CSIRO for potential application in Australia. There is also potential for small-scale water storage in wetlands or dry season water holes – although the scope for disruption of biodiversity in either of these options is a key consideration. Given the significant rates of evaporation and evapotranspiration, more innovative solutions than traditional surface water storage certainly have advantages in efficiency.

Conclusion

Ongoing research by the CSIRO will add to the body of knowledge informing suitable locations where additional irrigated agriculture in northern Australia will be most technically viable. This irrigated agriculture will be critical to the rapid population growth prescribed by the government’s 2015 white paper and will rely on effective water resource management and

infrastructure development. The outcome of the CSIRO's Flinders and Gilbert Catchment Water Resource Assessment echoes Bruce Davidson's conclusion from fifty years ago that unsubsidised irrigated agriculture would be economically unviable. Irrigated agriculture is not, however, the only industry that is water-critical. The 2009 NALWT science review highlighted that if northern Australia were a country, it would be the world's seventh largest beef exporter. Accelerated development in the north seems to hold a special place in the political culture of Australia, and the concept has spent more than half a decade at various stages of review. Ongoing research assessment will support or bust myths about the north. As Bruce Davidson wrote in 1966; 'it is technically possible to grow pineapples in Antarctica'. Technical feasibility is distinct from economic viability.

Any opinions or views expressed in this paper are those of the individual author, unless stated to be those of Future Directions International.

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