



Irrigated agricultural development in northern Australia: Value-chain challenges and opportunities



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A B S T R A C T

There is renewed interest in expanded agricultural development in northern Australia supported by increasing global demand for food, the region's proximity to Asian markets, and the current government policy initiatives to support economically sustainable and vibrant rural and regional communities. The production potential, financial returns, and the supply chain implications for irrigated agriculture were assessed in four different regions across northern Australia to provide a systems analysis of development opportunities and challenges. Gross margins for high volume, low value broadacre crops were mostly either negative or weakly positive, principally due to high transport costs to established markets in southern and eastern Australia. The returns were largely positive for higher value horticultural and specialist niche crops or industrial crops with local processing facilities. Scenarios incorporating alternative transport routes to Asia provided modest cost savings, but required assumptions for suitable shipping routes and cost-effective availability of containers, but did not significantly boost gross margins. When scaled to whole irrigation areas, the regional gross value of production could be significant but improving returns at farm scale requires more cost-effective supply chains. The ability to generate sufficient returns on capital investment was strongly influenced by the sequence of years associated with climatic variability and/or other unexpected shocks experienced in the years immediately following investment. The analysis highlighted that each component of the system – climate, soils, water, agronomic practice, pests and diseases, farm operations, management, planning, supply chains, infrastructure, labour, services, markets – needs to be understood but ultimate success will depend on managing the complexity of the whole farming system and value-chain. Further, scaling up development at a considered pace and being prepared for considerable lags before positive returns on investment are achieved will be critical for successful long-term irrigated agricultural ventures in northern Australia.

1. Introduction

Agricultural development in northern Australia has been variously described as the last frontier, the new frontier and the next frontier. All of these epithets convey a sense that this vast area north of the Tropic of Capricorn, comprising around 40% of Australia's land mass and < 5% of the national population, is waiting to be developed. Indeed, for well over a century there has been a succession of public and private initiatives to either promote or initiate intensive agriculture in northern Australia to complement the well-established extensive beef cattle industry and support a larger population and regional economy.

These development initiatives have met with mixed fortunes, some ending in disappointment and dashed hopes (Cook 2009; Pearson and Gorman 2010), while others have been successful and continue today (Ash, 2014).

Increased interest in agricultural development for northern Australia is being driven by a number of apparent opportunities. These include the proximity to Asian markets that are growing in both size and prosperity (Reardon and Timmer 2014), increasing global demand for food and natural fibre and its implications for food security (FAO 2009), and the development of economically sustainable and vibrant regional communities (Anon 2014).

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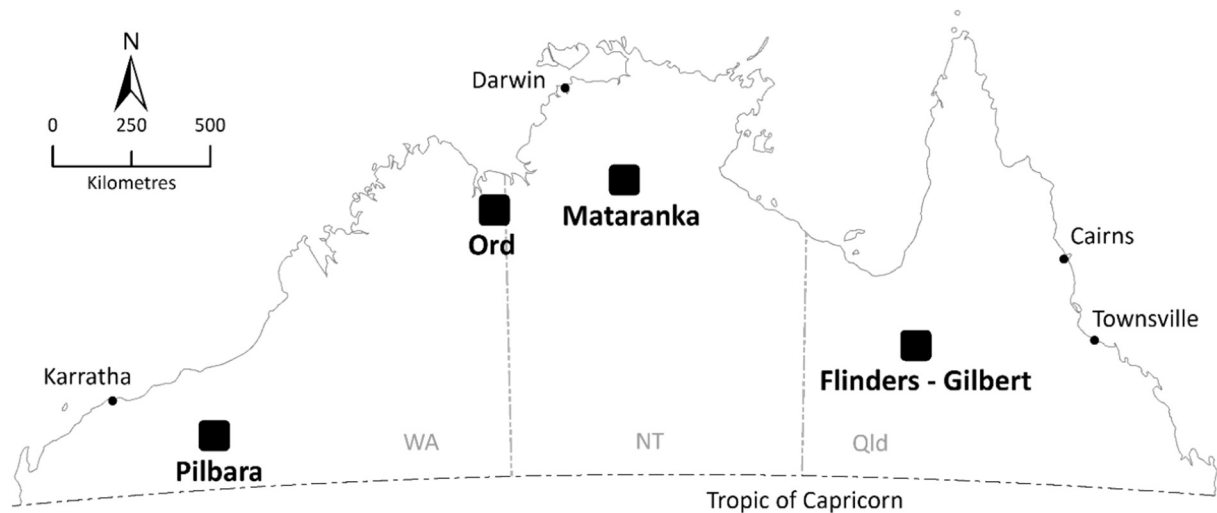


Fig. 1. Map showing the four study regions (denoted by squares) in northern Australia.

Direct challenges facing expanded agricultural development in northern Australia include:

- accessing suitable land and water resources to underpin expanded agricultural production
- navigating the various approval processes associated with land tenure, Native Title, water resource plans, environmental impact etc.
- sourcing the significant capital investment required to support the high cost of ‘greenfields’ agricultural development
- cost-effectively, reliably and sustainably growing agricultural products in the northern tropical environment and getting them to market via efficient supply chains
- establishing new and viable export markets for high-value, perishable fruit and vegetable products with high seasonality of supplies
- maintaining the ecological values of northern Australia.

Successfully addressing these challenges is critical to establishing the value proposition for northern agricultural expansion. Efficient agricultural systems, infrastructure and food supply chains are paramount for growing a productive and competitive agricultural sector to seize opportunities from changing patterns in global food consumption, and particularly in growing markets in Asia (Regional Australia Institute 2013).

The north Australian environment provides some particular opportunities and challenges for intensive agricultural development. The climate provides a comparative advantage for growing tropical fruits and vegetables compared with the temperate regions of southern Australia. More than 70 years of agronomic research has been applied to a wide range of crops suitable for northern conditions (Chapman et al. 1996). Apart from the considerable body of work on individual crops there was also a focussed effort over two decades on dryland farming systems, involving crop and ley pasture rotations (McCown 1996). This work was aimed at both maintaining soil fertility and health and understanding the role of crop rotations for increasing yields and returns. However, there has been relatively little research effort directed to crop rotations in irrigated agriculture in northern Australia, except for work on legume rotations in sugar cane (Garside and Bell 2011).

Expanded cropping development over much of northern Australia will be largely dependent on irrigation. This is because most of the annual rainfall occurs over a relatively short wet season and there is considerable year-to-year variability in both the duration of the wet season and the annual rainfall total. When these climatic constraints are combined with soil and agronomic management challenges in the semi-

arid tropics (McCown 1996) then dryland farming systems are likely to be opportunistic rather than mainstream. As a consequence, there has been no significant expansion of dryland cropping in tropical Australia in the last two decades.

While the major rivers of northern Australia can deliver large quantities of water that is nominally suitable for irrigation, the flows are strongly seasonal and the water is not always available in the best locations for siting intensive agriculture, nor are there many options for cost-effective storage and distribution of water (Petheram et al. 2008). Nevertheless, there are opportunities for significant scale irrigation development in different locations across northern Australia with a total estimated irrigation potential of 1.4 million ha from surface water storage (Petheram et al. 2014).

The scope of this potential contrasts with the actual established area of irrigated agriculture in northern Australia of only approximately 150,000 ha (ABS 2016, WA Department of Agriculture and Food: <https://www.agric.wa.gov.au/assessment-agricultural-expansion/ord-river-development-and-irrigated-agriculture>). This area is comprised of: 119,000 ha in Qld, mostly in the Burdekin and Mareeba-Dimbulah Irrigation Areas and serviced by large dams; 5000 ha in the Top End of the Northern Territory, largely using groundwater sources; and 30,000 ha in Western Australia, the vast majority which occurs in the Ord River Irrigation Area (Ord Stages 1 and 2) drawing water from Lake Argyle, and some small scale ground-water based irrigation in the West Kimberley region.

With these opportunities and challenges as context, we examined both the production potential and the supply chain implications for irrigated agricultural development opportunities in four different regions across northern Australia. While there has been considerable past agronomic work undertaken on the potential for individual crops and forages in northern Australia this has been in isolation from the dependent supply chains.

2. Methods

The study was centred on four regional case studies (Fig. 1):

- Ord River Irrigation Area, including expansion into the Northern Territory
- Katherine-Mataranka region of the Northern Territory
- Pilbara region in Western Australia, with a focus on water available through mine de-watering
- Flinders and Gilbert Rivers region of north Queensland

For each of these regional case studies, a range of issues were

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