Key findings

CSIRO has completed, for the Australian Government, an investigation of opportunities for water and agricultural development in the Flinders and Gilbert catchments of north Queensland. Each catchment offers the possibility of irrigation developments approaching (Flinders) or exceeding (Gilbert) the scale of the current Ord River Irrigation Area.

December 2013

The Flinders and Gilbert Agricultural Resource Assessment has, for each catchment:

- identified and evaluated water capture and storage options
- identified and tested the commercial viability of irrigated agriculture opportunities
- assessed potential environmental, social and economic impacts and risks.

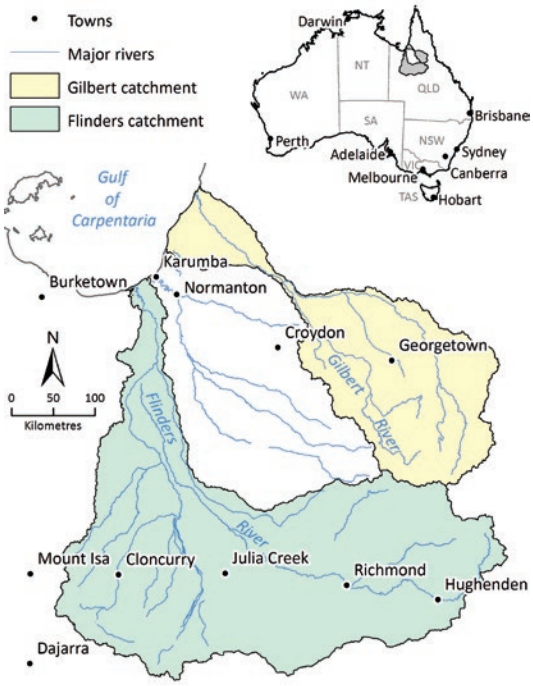
Despite their close proximity, the Flinders and Gilbert catchments differ significantly in their physical characteristics and, as a consequence, the extent to and methods by which agricultural development might occur.

The Flinders catchment

The Flinders catchment has the potential to support irrigated agricultural development (10,000 to 20,000 ha), approaching the scale of the current Ord River Irrigation Area, in 70 to 80% of years. The precise area under irrigation will, in any year, vary depending on factors such as irrigation efficiency, water availability, crop choice and risk appetite. Irrigation on this scale would be based on water stored in on-farm dams, pumped from the river or captured as overland flow during flood events. Irrigation of this type could be widely distributed across the catchment or concentrated into a smaller number of irrigation areas. The Flinders catchment does not have locations suited to large or cost-effective instream dams. Reliance on relatively shallow on-farm dams makes it unlikely that water could be carried over from one year to the next. Under these conditions, the area of irrigated agriculture would vary significantly from year to year and may not be possible in very dry years.

- Despite their close proximity, the Flinders and Gilbert catchments differ significantly in their physical characteristics and, as a consequence, the extent to and methods by which agricultural development might occur.
- In the Flinders catchment, farm dams could support 10,000 to 20,000 ha of irrigation in 70 to 80% of years; irrigation may not be possible in very dry years. The precise area under irrigation will, in any year, vary depending on factors such as irrigation efficiency, water availability, crop choice and risk appetite.
- In the Gilbert catchment, large instream dams could support 20,000 to 30,000 ha of irrigation in 85% of years. Again, the precise area under irrigation will, in any year, vary depending on factors such as irrigation efficiency, water availability, crop choice and risk appetite.
- Instream dams enable more reliable irrigated production than farm dams, because they can more easily carry water from one year to the next.
- Significant water use would, in the downstream environment, amplify the environmental and social challenges associated with dry years and would have impacts on commercial and recreational fishing catches that have not been quantified in this study.

This variability challenges the commercial viability of irrigation in the Flinders catchment. Under the development scenarios examined, the high capital costs of on-farm dams and land development (approximately $10,000 per ha of irrigated land) precluded commercial returns on investment where farmers paid the whole cost. Where third-party capital investment in water storage and delivery was examined commercial returns on irrigated agriculture were possible, but required consistent achievement of near potential yields, which can be challenging in the northern Australian environment.



The Flinders and Gilbert catchments in north Queensland

Australian Government
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The Gilbert catchment

The Gilbert catchment has the potential to support irrigated agricultural development (20,000 to 30,000 ha) exceeding the scale of the current Ord River Irrigation Area. The precise area under irrigation will, in any year, vary depending on factors such as irrigation efficiency, water availability, crop choice and risk appetite. Irrigation on this scale would be based on water stored in two large instream dams and delivered to an irrigation development up to 70 km downstream. Irrigation of this type would probably be concentrated into one area, capable of production sufficient to sustain a local cotton gin or sugar mill. The capacity of instream dams would enable water to be carried over from one year to the next, and it is likely that production of greater than 20,000 ha could be achieved in 85% of years.

Under the development scenarios examined, the high capital costs of instream dams and water delivery infrastructure (approximately $1 billion) precluded commercial returns on combined investment in water assets and irrigated farming. Where third-party capital investment in water storage and delivery was examined commercial returns on irrigated agriculture were possible, but required consistent achievement of near potential yields, which can be challenging in the northern environment.

For both the Flinders and Gilbert catchments significant water use would, in the downstream environment, amplify the environmental and social challenges associated with dry years. Reduced river discharges to the Gulf of Carpentaria would have impacts on commercial and recreational fishing catches that have not been quantified in this study. Large-scale change of land and water use in the catchments is likely to require a wide range of regulatory, social and cultural responses, including consideration of native title implications.

ITEM	FLINDERS CATCHMENT	GILBERT CATCHMENT
Climate	Hot semi-arid	Hot semi-arid
Mean annual rainfall	492 mm	775 mm
Median annual rainfall	454 mm	739 mm
Year-to-year rainfall variability	Very high (CV = 0.4)	Very high (CV = 0.4)
Mean annual evaporation	1860 mm	1868 mm
Mean annual runoff	37 mm	140 mm
Median annual runoff	22 mm	100 mm
Mean annual streamflow near river mouth	2540 GL	3700 GL
Median annual streamflow near river mouth	1240 GL	2590 GL
Area of soil moderately suitable for irrigated agriculture	>8 million ha	>2 million ha
Secondary soil salinity risk	High (on 3.5 million ha of soils)	Generally low
Most promising water storage method	On-farm dams	Large instream dams
Most promising potential water storage volume	350 GL (70 to 80% reliability)	Dagworth dam: 498 GL Green Hills dam: 227 GL (85% reliability)
Simple capital cost per ML of most promising storage (approximate)	$1000/ML	$1100/ML
Potential water storage % total streamflow near river mouth	14% of mean flow 28% of median flow	14% of mean flow 20% of median flow
Potential volume of irrigation water delivered to crop	175 GL (70 to 80% reliability)	250 GL (85% reliability)
Potential irrigation area	10,000 to 20,000 ha	20,000 to 30,000 ha
Potential irrigation area % of catchment area (approximate)	0.2%	0.6%
Area of the catchment (approximate)	109,000 km^2	46,000 km^2

Key biophysical characteristics related to irrigation development in the Flinders and Gilbert catchments.

The Flinders and Gilbert Agricultural Resource Assessment was conducted for the Office of Northern Australia in the Australian Government Department of Infrastructure and Regional Development under the North Queensland Irrigated Agriculture Strategy <http://www.regional.gov.au/regional/ona/nqias.aspx>. The Strategy is a collaborative initiative of the Office of Northern Australia and the Queensland Government. One part of the Strategy is the Flinders and Gilbert Agricultural Resource Assessment, which is led by CSIRO. Important aspects of the Assessment were undertaken by the Queensland Government and TropWATER (James Cook University).

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