

Agricultural resource assessment for the Flinders catchment

A report to the Australian Government from the
CSIRO Flinders and Gilbert Agricultural Resource Assessment,
part of the North Queensland Irrigated Agriculture Strategy

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The Strategy was guided by two committees:

(i) the **Program Governance Committee**, which included the individuals David Crombie (GRM International), Scott Spencer (SunWater, during the first part of the Strategy) and Paul Woodhouse (Regional Development Australia) as well as representatives from the following organisations: Australian Government Department of Infrastructure and Regional Development; CSIRO; and the Queensland Government.

(ii) the **Program Steering Committee**, which included the individual Jack Lake (Independent Expert) as well as representatives from the following organisations: Australian Government Department of Infrastructure and Regional Development; CSIRO; the Etheridge, Flinders and McKinlay shire councils; Gulf Savannah Development; Mount Isa to Townsville Economic Development Zone; and the Queensland Government.

Chapters 1 to 7 of this report were reviewed by Dr Andrew Ash (CSIRO Ecosystem Sciences) and Dr Ellen Douglas (University of Massachusetts Boston). Dr Peter Wallbrink (Water for a Healthy Country Flagship) reviewed the entire report. The following people reviewed all or part of one or more case studies (chapters 8 to 10): Dr Lindsay Bell (CSIRO Ecosystem Sciences), Dr Ellen Douglas (University of Massachusetts Boston), Dr Stuart Whitten (CSIRO Ecosystem Sciences), Dr Michael Robertson (CSIRO Ecosystem Sciences), Dr Brad Pusey (River Research Pty Ltd), Dr Andrew Ash (CSIRO Ecosystem Sciences), Dr Fazlul Karim (CSIRO Land and Water) and Dr John Gallant (CSIRO Land and Water).

For further acknowledgements, see page vi.

Director's foreword

Northern Australia comprises approximately 20% of Australia's land mass but remains relatively undeveloped. It contributes about 2% to the nation's gross domestic product (GDP) and accommodates around 1% of the total Australian population.

Recent focus on the shortage of water and on climate-based threats to food and fibre production in the nation's south have re-directed attention towards the possible use of northern water resources and the development of the agricultural potential in northern Australia. Broad analyses of northern Australia as a whole have indicated that it is capable of supporting significant additional agricultural and pastoral production, based on more intensive use of its land and water resources.

The same analyses also identified that land and water resources across northern Australia were already being used to support a wide range of highly valued cultural, environmental and economic activities. As a consequence, pursuit of new agricultural development opportunities would inevitably affect existing uses and users of land and water resources.

The Flinders and Gilbert catchments in north Queensland have been identified as potential areas for further agricultural development. The Flinders and Gilbert Agricultural Resource Assessment (the Assessment), of which this report is a part, provides a comprehensive and integrated evaluation of the feasibility, economic viability and sustainability of agricultural development in these two catchments as part of the North Queensland Irrigated Agricultural Strategy. The Assessment seeks to:

- identify and evaluate water capture and storage options
- identify and test the commercial viability of irrigated agricultural opportunities
- assess potential environmental, social and economic impacts and risks.

By this means it seeks to support deliberation and decisions concerning sustainable regional development.

The Assessment differs from previous assessments of agricultural development or resources in two main ways:

- It has sought to 'join the dots'. Where previous assessments have focused on single development activities or assets – without analysing the interactions between them – this Assessment considers the opportunities presented by the simultaneous pursuit of multiple development activities and assets. By this means, the Assessment uses a whole-of-region (rather than an asset-by-asset) approach to consider development.
- The novel methods developed for the Assessment provide a blueprint for rapidly assessing future land and water developments in northern Australia.

Importantly, the Assessment has been designed to lower the barriers to investment in regional development by:

- explicitly addressing local needs and aspirations
- meeting the needs of governments as they regulate the sustainable and equitable management of public resources with due consideration of environmental and cultural issues
- meeting the due diligence requirements of private investors, by addressing questions of profitability and income reliability at a broad scale.

Most importantly, the Assessment does not recommend one development over another. It provides the reader with a range of possibilities and the information to interpret them, consistent with the reader's values and their aspirations for themselves and the region.

Peter Stone

Dr Peter Stone, Deputy Director, CSIRO Sustainable Agriculture Flagship

Key findings

North Queensland's Flinders catchment, comprising an area of approximately 109,000 km², drains into the southern Gulf of Carpentaria. Its population of approximately 6000 people is engaged mainly in pastoralism, but tourism, mining and commercial fishing make important contributions to the economy. Dryland and irrigated cropping currently occupy less than 0.02% of the landscape.

This report on the Flinders catchment seeks to:

- identify and evaluate water capture and storage options
- identify and test the commercial viability of irrigated agricultural opportunities
- assess potential environmental, social and economic impacts and risks.

The Assessment acknowledges that locals have insights, skills and aspirations to contribute to development plans for the benefit of their region, community and environment. Scientific knowledge of the type produced by this Assessment should complement rather than compete with local knowledge.

Water capture and storage options

Offstream storages such as farm dams provide the most promising method for supporting large-scale irrigation development in the Flinders catchment. Combined offstream storage is capable of delivering to crops approximately 175 gigalitres (GL) of irrigation water in 70 to 80% of years. This is approximately half of the full storage potential (350 GL) of offstream storages.

The six most promising instream dams in the Flinders catchment are collectively capable of delivering approximately 80 GL to crops in 85% of years, at a cost of >\$6000/ML/year at the dam wall. Offstream storages in the Flinders catchment are likely to be approximately ten times more cost effective than instream storages.

There is more soil suited to irrigation in the Flinders catchment than there is water to irrigate it. If offstream storages were developed to their full (350 GL storage) potential, it would be possible to irrigate approximately 0.2% of the catchment's irrigable soils.

Agricultural opportunities

Based on the identified water storage and the large areas of potentially irrigable agricultural soils (more than 8 million ha, 2 million of which are most promising), there is the potential for an irrigation development totalling 10,000 to 20,000 ha, supporting year-round mixed irrigated and dryland cropping. The precise area under irrigation will, in any year, vary depending on factors such as irrigation efficiency, water availability, crop choice and risk appetite. A development of this size is similar in scale to the existing Ord River Irrigation Area and may be able to sustain local processing facilities such as a cotton gin. The irrigated area would not be contiguous, but would appear as discrete irrigation areas of approximately 500 to 1000 ha each, distributed across the catchment. If crops were grown to their full potential, the regional gross margin of crop production could exceed \$35 million/year.

Dryland production is sensitive to the very high year-to-year variability of rainfall in the Flinders catchment. Break-even yields of most crops can be achieved only one to two years in ten, which precludes commercial returns on development costs such as land clearing. If these costs are 'sunk', commercial returns from dryland cropping require that crops approach their full yield potential and that they are grown only in years when cropping opportunity is high. Cropping opportunity can be distinguished clearly at sowing time. Despite these challenges, dryland cropping has potential as a component of irrigation development.

Environmental impacts and risks

Irrigated agricultural development has a wide range of potential benefits and risks.

Offstream storage of 350 GL would, in the downstream environment, amplify the environmental and other challenges associated with dry years. Critical environmental processes (such as wetland inundation) would not be greatly affected by water extraction in 'average' or wet years, largely because water storage of 350 GL would intercept a mean 14% and a median 28% of flow to the Gulf of Carpentaria. Impacts of reduced river discharges to the Gulf on commercial and recreational fishing catches are possible but have not been quantified in this study. Large-scale change of land and water use is likely to require a wide range of regulatory, social and cultural responses, including consideration of native title implications.

Under the development scenarios examined, the high capital costs of instream and on-farm dams and water delivery infrastructure precludes reliable economic returns on combined investment in water assets and irrigated farming. Where third-party investment in water storage and delivery was examined, whether on-farm or instream, it was found that commercial returns on irrigated agriculture are possible when crops approach their full yield potential – a condition that becomes more probable with experience.

Key deliverables

This report is one of two catchment reports within a suite of products provided by the Assessment to fulfil its contractual obligations:

- Technical reports present scientific work at a level of detail sufficient for technical and scientific experts to reproduce the work.
- Each of the two catchment reports (i.e. this report and another for the Gilbert catchment) synthesises key material from the technical reports, providing well-informed but non-scientific readers with the information required to make decisions about the opportunities, costs and benefits associated with irrigated agriculture.
- Two overview reports – one for each catchment – are provided for a general public audience.
- A factsheet provides key findings for both the Flinders and Gilbert catchments for a general public audience.

All these products are listed in full in Appendix A.

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Each of the accompanying technical reports (see Appendix A) contains its own set of acknowledgements. Here we acknowledge those people who went 'above and beyond' and who contributed across the Assessment activities.

The communities of the Flinders and Gilbert catchments enthusiastically embraced the Assessment team. They provided: (i) hospitality, (ii) historical and contextual information, (iii) access to land and help in finding waterholes, bores, promising dam sites and other features, (iv) unpublished reports, and (v) answers to a bewildering array of questions from the Assessment team. Importantly, they also gave us 'the time of day', showing us around the catchment and their landholdings and providing the local context that is so important for work of this kind. In particular, we thank the members of FRAP, the Flinders River Agricultural Precinct. Brendan McNamara as Chair was welcoming from the beginning. Corbett Tritton, Chair of the Flinders River Agricultural Precinct Growers Group and a local grazier and irrigator was generous with his time, expertise and insights into agricultural development as well as providing access to his crops for the Assessment team to collect data. Ninian Stewart-Moore, Brian Hughes, Ardie Lord, Darren Beeton, Alistair McClymont, Edward McIntosh, Scott Harris, Campbell Keough, David and Kenneth Coleman, Colin Blacklock, Ray Theme, Jacqueline and Robert Curley as well as many other landholders helped the Assessment team. Brad Bowen and Ken and Brendan Fry took us through their existing irrigated enterprises. Grant Randell contributed both his expertise and his land and water to help us understand the opportunities for a range of crops. Landholders also contributed their time to formal surveys of their attitudes to agricultural development in the two catchments. Julie Harrison, the FRAP Project Officer, provided an enormous amount of assistance to the Assessment team. If Julie didn't know the answer to a question, she put us in touch with someone who did. She helped organise our contacts with the local community and, importantly, Julie was such an enthusiastic supporter and advocate of the Assessment team that she provided the credibility that we needed for others to contribute their thoughts, expertise and information.

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Contents

Director’s foreword	i
Key findings	ii
The Flinders and Gilbert Agricultural Resource Assessment team	iv
Acknowledgements	vi

Part I Introduction 1

1	Preamble	2
1.1	Context: development in northern Australia	2
1.2	Flinders and Gilbert Agricultural Resource Assessment	4
1.3	Report objectives and structure	6
1.4	References	8
2	Key concepts and Assessment methods	10
2.1	Key concepts	10
2.2	Assessment methods	12
2.3	References	29

Part II Information for assessing potential scheme-scale and farm-scale irrigation developments 33

3	Physical environment of the Flinders catchment	34
3.1	Summary	35
3.2	Geology	36
3.3	Soils of the Flinders catchment.....	37
3.4	Climate	46
3.5	Hydrology	55
3.6	References	77
4	Living and built environment of the Flinders catchment.....	82
4.1	Summary	83
4.2	Ecology of the Flinders catchment.....	84
4.3	Indigenous pre-history and colonial history of the Flinders catchment.....	95
4.4	Indigenous water values, rights and interests and Indigenous development aspirations	101
4.5	Broader social environmental values.....	108
4.6	Catchment profile	108
4.7	References	124
5	Opportunities for irrigation in the Flinders catchment.....	132
5.1	Summary	133
5.2	Water storage opportunities	134
5.3	Water distribution systems – conveyance of water from storage to the crop	165
5.4	Land development for irrigation.....	174
5.5	Cropping and other agricultural opportunities.....	175

5.6	Summary of dam and scheme-scale costs	221
5.7	References	222
6	Overview of the economic opportunities and constraints	228
6.1	Summary	229
6.2	Farm-scale opportunities	230
6.3	Scheme-scale opportunities	241
6.4	Legislation and regulation.....	250
6.5	Regional-scale impacts.....	252
6.6	References	253
7	How can the sustainability of irrigated agriculture be maximised?	256
7.1	Summary	257
7.2	Risk of irrigation-induced salinisation.....	258
7.3	Managing irrigation drainage	265
7.4	Ecological implications of altered flow regimes	267
7.5	References	270
Part III Case studies		275
8	Cave Hill dam and irrigated sorghum (grain)	276
8.1	Summary	277
8.2	Storyline for this case study.....	278
8.3	Soils near Cloncurry	281
8.4	Climate suitability for sorghum (grain) at Cloncurry	283
8.5	Configuration of irrigation developments and cropping systems	284
8.6	Financial analysis.....	290
8.7	On-site and off-site impacts.....	302
8.8	References	305
9	O’Connell Creek offstream storage and irrigated rice	308
9.1	Summary	309
9.2	Storyline for this case study.....	310
9.3	Soils at Maxwellton.....	312
9.4	Geophysics investigation	314
9.5	Climate suitability for rice near Richmond	316
9.6	Configuration of irrigation development and cropping systems.....	317
9.7	Financial analysis.....	322
9.8	On-site and off-site impacts.....	334
9.9	References	337
10	Water harvesting and a variety of irrigated crops	340
10.1	Summary	341
10.2	Storyline for this case study.....	342
10.3	Soils along the Flinders and Cloncurry rivers.....	345
10.4	Land suitability.....	347
10.5	Climate of the Flinders catchment.....	349
10.6	Streamflow and its reliability in the Flinders catchment.....	350

10.7	Irrigated crop production.....	361
10.8	Financial analysis.....	363
10.9	References	366

Appendixes	1
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Appendix A	2
Assessment products	2
Appendix B.....	373
Shortened forms	373
Geological timeline.....	375
Units	376
Data sources and availability.....	377
Glossary and terms.....	379
Appendix C.....	381
List of figures	381
Appendix D	389
List of tables	389

Part I Introduction

Chapters 1 and 2 provide background and context for the Assessment and outline the methods adopted to undertake the work:

- Chapter 1 covers the background and context of the Assessment.
- Chapter 2 provides a high-level outline of the methods used by the Assessment. This information is designed to assist in understanding the limitations to – and uncertainty associated with – the information provided by the Assessment.

Readers will find these chapters provide the context for and critical foundational information about the Assessment with key concepts introduced and explained.

For a synthesis of the key findings from the Assessment, see page ii.

