



Agricultural resource assessment for the Gilbert 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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Flinders and Gilbert Agricultural Resource Assessment acknowledgments

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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 Department of Agriculture, Fisheries and Forestry.

(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 Graham Bonnett (CSIRO Plant Industry) and Dr Glen Walker (CSIRO Land and Water).

Dr Brian Keating (Sustainable Agriculture Flagship) and 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 Andrew Ash (CSIRO Ecosystem Sciences) and Dr Brad Pusey (River Research Pty Ltd).

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 Gilbert catchment, comprising an area of approximately 46,000 km², drains into the southern Gulf of Carpentaria. Its population of approximately 1200 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 Gilbert 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

Two prospective instream water storages (dams) of significant scale have been identified (Green Hills and Dagworth dams). When combined, these two dams are capable of delivering to crops approximately 250 gigalitres (GL) of water in 85% of years. The next four most prospective instream dams add relatively small volumes of water at relatively high cost.

There is more soil suited to irrigation in the Gilbert catchment than there is water to irrigate it. If the most prospective six instream storages were to exist, it would be possible to irrigate approximately 0.6% of the catchment's irrigable soils.

On-farm dams are considered less prospective because of the catchment's often sandy soils, though there are locations suited to on-farm water storage.

Agricultural opportunities

Based on the identified water storage and the large areas of potentially irrigable agricultural soils (approximately 2 million ha), there is the potential for an irrigation development of 20,000 to 30,000 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 scale is larger than the existing Ord River Irrigation Area, and may be sufficient to sustain local processing facilities such as a cotton gin or a sugarcane mill. If crops were grown to their full potential, the regional gross margin of crop production could exceed \$60 million/year.

Dryland production is sensitive to the very high year-to-year variability of rainfall in the Gilbert catchment. Break-even yields of most crops can be achieved only two to three 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. This can be clearly distinguished at sowing time using seasonal rainfall outlooks and information about water stored in dams and in soil. Despite these challenges, dryland cropping is likely to be a component of irrigation development.

Environmental impacts and risks

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

The two most prospective dams 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 the dams would be located in the middle reaches of the catchment and would intercept a mean 14% and median 20% 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 dams and water delivery infrastructure (approximately \$1 billion) precludes economic returns on combined investment in water assets and irrigated farming. Where third-party investment in water storage and delivery was examined, it was found that commercial returns on irrigated agriculture are possible when crops approached 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 Flinders 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
Contents	viii
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 Gilbert catchment	34
3.1 Summary	35
3.2 Geology	36
3.3 Soils of the Gilbert catchment	37
3.4 Climate	47
3.5 Hydrology	56
3.6 References	77
4 Living and built environment of the Gilbert catchment	80
4.1 Summary	81
4.2 Ecology of the Gilbert catchment	82
4.3 Indigenous pre-history and colonial history of the Gilbert catchment	93
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	121
5 Opportunities for irrigation in the Gilbert catchment	128
5.1 Summary	129
5.2 Water storage opportunities	130
5.3 Water distribution systems – conveyance of water from storage to the crop	162

5.4	Land development for irrigation.....	171
5.5	Cropping and other agricultural opportunities.....	172
5.6	Summary of dam and scheme-scale costs.....	220
5.7	References	221
6	Overview of economic opportunities and constraints.....	226
6.1	Summary	227
6.2	Farm-scale opportunities	228
6.3	Scheme-scale opportunities	238
6.4	Legislation and regulation.....	246
6.5	Regional-scale impacts.....	249
6.6	References	249
7	How can the sustainability of irrigated agriculture be maximised?	252
7.1	Summary	253
7.2	Risk of irrigation-induced salinisation.....	254
7.3	Managing irrigation drainage	262
7.4	Ecological implications of altered flow regimes	264
7.5	References	267
Part III Case studies		271
8	Green Hills dam and irrigated three-crop rotation	272
8.1	Summary	273
8.2	Storyline for this case study.....	274
8.3	Soils near Green Hills	277
8.4	Climate suitability for cotton, peanuts and sorghum (forage) at Green Hills.....	279
8.5	Scheme configuration and cropping systems	280
8.6	Financial analysis.....	287
8.7	On-site and off-site impacts.....	303
8.8	References	307
9	Dagworth and Green Hills dams and irrigated sugarcane	310
9.1	Summary	311
9.2	Storyline for this case study.....	312
9.3	Soils along the Gilbert and Einasleigh rivers.....	315
9.4	Climate suitability of sugarcane in the Georgetown area	319
9.5	Scheme configuration and cropping systems	320
9.6	Financial analysis.....	328
9.7	On-site and off-site impacts.....	341
9.8	References	346
10	Kidston Dam and irrigated Rhodes grass	348
10.1	Summary	349
10.2	Storyline for this case study.....	350
10.3	Soils near Einasleigh.....	352
10.4	Geophysics investigation	355
10.5	Climate suitability for irrigated forage crops near Einasleigh.....	357

10.6	Configuration of irrigation developments and cropping systems	358
10.7	Financial analysis.....	363
10.8	On-site and off-site impacts.....	373
10.9	References	377

Appendixes		379
Appendix A		380
Assessment products		380
Appendix B.....		383
Shortened forms		383
Geological timeline.....		385
Units		386
Data sources and availability.....		387
Glossary and terms.....		389
Appendix C.....		391
List of figures		391
Appendix D		400
List of tables		400

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.

