

Saving irrigation water, the environment and money

By Sarah Hood¹ and Jenelle Hare²

Over the past two cotton seasons Darling Downs agronomists, cotton growers, economists and environmental groups worked together to analyse the economic and environmental cost benefits of various irrigation projects that could be implemented on cotton farms to improve water use efficiency.

This project also allowed some informed observations to be made about the social benefits of improved water management.

This project was managed by Cotton Australia, commissioned by the Condamine Alliance and the Cotton CRC, as part of a Department of Agriculture, Forestry and Fisheries (DAFF) project.

Agronomists were the target audience as they are industry's preferred irrigation knowledge brokers. Other industry projects were also engaging cotton consultants through irrigation knowledge broker mentoring and training activities and partnerships were developed between these projects to avoid duplication.

The Cotton industry's Best Management Practices program (Cotton BMP), Land and Water Module, was used to identify potential risks of current irrigation management and associated knowledge and skill development opportunities. This module also



Jenelle Hare, a central member of the project team.

helped the team identify potential management options to address irrigation management risks and develop action plans.

Dedicated resources including monetary co-investment were made available to support decision making, planning, knowledge and skill development. Specialist extension staff and researchers provided critical information, training and support,

environmental stakeholders assessed environmental outcomes and economists calculated the estimated return on investment of the proposed management options

BACKGROUND

Australia is a dry country. All water users have been increasingly under pressure to demonstrate their 'social' water license. The Australian cotton industry is a major user of agricultural water entitlements, utilising 15 per cent of the water consumed by agriculture in 2005. Cotton Australia developed a Land and Water module under their best management practices program (Cotton BMP) to assist the industry to meet multiple community and global expectations on their responsible use of water resources.

The Condamine River is approximately 500 km long and the Condamine Catchment is home to approximately 162,000 people and 3600 farmers. Of these farmers, approximately 200 grow cotton in rotation with other crops. The uptake of Cotton BMP has been limited with approximately 10 per cent participation.

In 2004 the Cotton Catchment Communities CRC commissioned an investigation of irrigation knowledge management in the cotton and grain industries. This study recognised that knowledge influences competitiveness, responsiveness



Brad Tatzenko, measures a furrow profile as part of a surface irrigation evaluation for one of his clients.

and levels of innovation and sought to understand how the industry is using and managing current irrigation knowledge. Major findings were:

- Cotton growers preferred to access irrigation information from their agronomic consultants;
- Agronomic consultants felt they lacked knowledge, experience and skills in emerging irrigation information and technologies;
- Cotton growers felt that emerging tech-

nologies and recommended best irrigation practices had not been practically tested; and that,

- Financial and labour costs of introducing new technologies and farming practices had not been considered.

The cotton industry in the Condamine Catchment is well supported, with over 20 agronomists and multiple organisations conducting various water use efficiency research, development and extension programs. It seemed likely that improving the

capacity of advisers to provide irrigation advice in conjunction with their traditional agronomic services may have multiple benefits. Such benefits may include accelerated adoption of sustainable irrigation practices, leading to economic, environmental and social outcomes and improved post project adoption.

It was thought that Cotton BMP best irrigation practice could provide the framework to co-ordinate the knowledge and

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facilitate collaborative action. With agronomists acting as the conduit of the co-ordinated knowledge, it was also obvious that an economic analysis would be valuable alongside investigations of both the practicalities and environmental benefits of actions being employed by cotton growers.

OUTCOMES

Of approximately 20 crop consultants operating on the Darling Downs, five accepted the invitation to participate in the project. These five consultants had a collective total of over 100 clients which is approximately half of the Darling Downs cotton growers.

Over two seasons these five consultants worked with 16 of their clients, who manage over 20,000 hectares of irrigation country on the Darling Downs. Of the 16 growers, 14 were new to the Cotton BMP program Land and Water Module. Subsequently, managers of over 10,000 hectares of irrigated cotton country in the Condamine Catchment completed the Cotton BMP Land and Water Pre-certification assessment. Planned investigations were implemented on over 3000 hectares.

Several key irrigation management risks for the Darling Downs cotton industry were identified as a result of participating in the Cotton BMP program Land and Water module. These risks included:

- Field irrigation management (including furrow and overhead irrigation methods);
- Water metering (particularly in relation to whole farm water use efficiency);
- Storage management; and,
- Crop water use measurement (evapotranspiration).

During the project, agronomists and their clients addressed these management risks and investigated activities ranging from evaluating field irrigation perform-

TABLE 1: Activities, recommendations, water savings and return on investment for the project

Case	Activity	Recommendation	Water savings (ML/ha)	ROINPV (20 yrs)	Pay-off period (yrs)
1	Furrow irrigation evaluation	Increase siphon size from 2" to 2.5"	0.3	\$104 000	1
2	Furrow irrigation evaluation	Double siphons and shorten time	0.3	\$123 000	0
3	Storage management	Storage curve, meter, EM survey and earthworks	0.14	\$26 025	3
4	Furrow irrigation evaluation	Shift head ditch to side of field for shorter row length		\$103 000	4
5	Furrow irrigation evaluation	Lateral move installation	0.7	\$270 000	7
6	Furrow irrigation management	Halve the field length (own earthmoving equipment)	0.27	\$62 000 (10 years)	1
7	Overhead irrigation evaluation	New sprinkler package	0.13 bales/ML	\$32 000	1

ance and therefore crop water use to storage management and whole farm water use efficiency. Of the 16 growers engaged, 11 investigated furrow irrigation management, one investigated overhead irrigation management, one investigated overhead and furrow irrigation management, two investigated storage management and one investigated whole farm water use efficiency.

These investigations resulted in four growers finding out that they were performing at acceptable standards which generated the most evidence about the social benefit of evaluating current irrigation practice. One grower commented that "this means I can reduce the time and energy I am using on wondering if I am optimising my water use and concentrate on optimising other inputs such as fertiliser."

Of the 12 remaining cases, several options to address less than optimal performance measures were investigated (Table 1). For example, the furrow irrigation evaluations resulted in recommendations ranging

from changing siphon sizes and/or shift lengths, changing field configuration and/or length and installing a lateral move.

The overhead irrigation evaluations resulted in recommendations about nozzle configuration and soil management. Storage management resulted in recommendations involving earthworks and benchmarking performance.

All recommendations were expected to result in water savings ranging from 0.14 ML per hectare per irrigation to 0.7 ML per hectare. Most recommendations were implemented by the growers, except for one which is planned to be in the near future. This means the project has resulted in environmental benefits through increased precision of water application and therefore reduced risk of water moving to undesirable areas of the landscape.

Adoption of recommendations meant that catchment targets for improved water management in the cotton industry were exceeded. Economically all recommendations proved favourable with positive net



Simon Green of Meteora Pty Ltd resets an Irrimate advance meter.



The Total Ag Service team from Dalby learning how to complete a systems audit of a centre pivot.



Darling Downs agronomists at a surface irrigation evaluation workshop.



Johan from Total Ag Services Dalby resets an Irrimate advance meter.

present values over 20 years and a pay-back period of one to 11 (Table 1).

Follow up interviews with the growers also demonstrated the social and psychological benefits of investigating and improving water management. One grower said, "With the higher flow rate I know that when I come back at a certain time all the rows will be through. This has been the best part as I can spend less time thinking and worrying about irrigating and more time on other things."

Ultimately the project demonstrates that implementing irrigation best practice on cotton farms in the Condamine Catchment has environmental, economic and social benefits.

The agronomic consultants played a pivotal role in the success of this project by participating in meetings and discussion groups, completing training, partnering their clients and developing the skills to provide irrigation services that they had not previously provided.

Discussions with the consultants at the end of the project demonstrated an improved confidence in both the services traditionally provided such as irrigation scheduling and water budgeting but also in additional services such as precision water application. As one consultant said, "I will be able to impart information to our clients with more confidence and provide relevant solutions."

CONCLUSION

The project was most successful. It was a worthwhile project initiated by Condamine Alliance, in partnership with industry and local service providers. It delivered some tangible numbers to growers on the economic benefit of sustainable practices and a greater understanding of the environmental benefits of improved water use efficiency.

As a result of this project:

- Twenty-five per cent of the Darling Downs cotton consultants improved their knowledge and skills in irrigation water use efficiency and their ability to access industry irrigation information and networks.
- Eight per cent of Darling Down cotton growers improved their knowledge and skills in irrigation water use efficiency and their ability to access irrigation information and network.
- A further 10,000 hectares of irrigated cotton country on the Darling Downs is being managed according to the industry's irrigation best practice guideline.
- Participation in the Cotton BMP Land

and Water Module was almost doubled on the Darling Downs.

The coordinated and dedicated effort was a significant factor in the success of the project. This has been a tremendous opportunity – a 'win-win' situation for everyone involved in the project. For growers it has meant obtaining quantitative measurements including the return of investment in changing current practice. Consultants in a very short time have fine-tuned their irrigation service and delivery with increased confidence, knowledge and skills."

¹Cotton Australia.

²Queensland Department of Primary Industries and Fisheries.



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