

# **Queensland Rural Water Use Efficiency Initiative (RWUEI) and Its Demonstrated Role In Community Engagement with the Irrigation Industry**

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## **Abstract**

With increasing competition on available water resources, Queensland (like other Australian states) has long recognised the need to improve performance in the irrigation industry to ensure availability, competitiveness, profitability and environmental sustainability. Australia is a dry continent with much of its agricultural production heavily dependent upon irrigation. Rainfall conditions are extremely variable, often dominated by droughts. With increasing demands, the challenge for Queensland's irrigated agriculture is the development of smarter ways to accommodate such demands while ensuring resource sustainability. Water usage and management by irrigators must therefore be based fundamentally on efficiency.

Governments have a variety of ways of engaging people or influencing them in development activities. By focussing on the farm the Queensland Government Rural Water Use Efficiency Initiative (RWUEI) has been able to engage (work) directly with growers who are by far the largest users and therefore with biggest impact on the sustainability of the state's water resources; to help them identify areas to improve their water use efficiency on the farm. In active partnership with four major irrigation organisational bodies — Canegrowers, Cotton Australia, Queensland Dairy Farmers Organisation, and Queensland Fruit & Vegetable Growers — RWUEI has managed to make overwhelming improvements in irrigation efficiencies across the state.

According to an independent valuation report, the four industry organisations achieved well beyond their Phase I (1999–2003) expected targets, in both productivity and water savings; with a demonstrated strong farmer participation and interest of 80 to 90 per cent across the industries. Experienced project field extension officers ('irrigation experts') worked along with growers to run on-farm trials and research and development projects, and collected and collated data that formed the newly adopted irrigation practices and guidelines. Water committee groups openly discussed irrigation issues, with on-farm training conducted through formal extension including information communication and networking. With such partnerships, government reinforced its working relationships with stakeholders and other agencies associated with water resource management; and reaffirmed trust and confidence. RWUEI also displayed great potential for wider application by effectively reaching all growers,

retaining and creating rural employment and demonstrating effectiveness of incentives in facilitating adoption. The perception of water and impact of reform policies also emerged.

RWUEI's overwhelming success was recognised with a National Irrigation Award for 2002–03 (under 'Best working relationships with the water industry') and was also extended to Phase 2.

### **Keywords**

Queensland Rural Water Use Efficiency Initiative (QRWUEI/RWUEI), RWUEI Adoption Program, joint local trials, R&D projects, communication, consultation, education and training

### **Introduction**

Australia, being the driest continent on earth, is heavily dependent upon irrigation for much of its agricultural production. Rainfall conditions are extremely variable and are often dominated by droughts. Irrigation cropping enterprises are the most intensive and largest users of water and demand in this area is expected to increase. Therefore, the challenge facing irrigated agriculture in Australia today is to develop ways to accommodate ongoing demands for water while ensuring resource sustainability. The way water is used and managed must be based fundamentally on efficient management that ensures the long-term viability of agricultural industries.

With increasing competition for the available water resources, Queensland (like other states) has therefore long recognised the need to improve the way water is used on the farm to ensure availability, competitiveness, profitability and environmental sustainability. By focusing on the farm, RWUEI has been able to work directly with growers, who are by far the largest users and therefore have the biggest impact on the sustainability of the state's water resources (Tables 3 and 4) — to help them identify areas to improve their water use efficiency (WUE) of the water available on the farm. RWUEI has been a partnership between government (Department of Natural Resources and Mines — NR&M) and four major irrigation industry bodies (dairy & lucerne, cotton & grains, horticulture and sugar cane) and is aimed at improving the way irrigation water is used and managed at farm level.

Ongoing maintenance and development of water infrastructure, together with effective and efficient use of available supplies, have also been necessary to ensure that the irrigation industry bodies can be assured of reliable access to water and continue to generate income and employment growth.

**Table 1. Agricultural water use, Australia (national)**

<b>Crop</b>	<b>Area Irrigated (ha)</b>	<b>Application rate (kl/ha)</b>	<b>Total water applied (ML)</b>
All cereals	335,972	6.9	2,191,479
Rice	152,367	10.9	1,653,178
Horticulture	241,346	-	1,987,366
vegetables	(88,782)	7.2	(634,913)
grapevines	(69,120)	9.3	(643,124)
other fruits	(83,444)	10.8	(709,328)
Sugar	173,224	7.1	1,236,249
Cotton	314,957	5.8	1,841,341
Other crops	56,718	7.5	423,448
Pasture	939,364	6.1	7,232,722
<b>TOTAL</b>	<b>2,056,580</b>		<b>14,912,660</b>

Source: Dunlop et al. (2000)

**Table 2. Water use, pastures and broadacre crops, Australia (state and national)**

	<b>Area irrigated (ha)</b>	<b>Total water applied (ML)</b>	<b>Average rainfall (mm)</b>	<b>Irrigated area of pastures (ha)</b>	<b>Irrigated area of crops (ha)</b>	<b>Total water applied to pastures (ML)</b>	<b>Total water applied to crops (ML)</b>
Australia	2,056,580	14,912,660	431	934,364	1,122,216	7,232,722	7,679,938
NSW	907,501	7,180,072	521	346,163	560,888	2,965,716	3,214,356
Vic	546,067	4,042,420	715	454,734	91,333	3,322,977	719,443
Qld	403,775	2,176,939	608	47,748	356,027	205,149	971,790
SA	115,479	991,479	198	50,123	65,356	523,985	467,494
WA	30,444	339,482	306	10,592	19,856	155,855	243,627
NT	1,953	8,856	462	175	1,778	2,230	6,626
Tas	51,734	112,984	379	24,786	26,952	56,518	56,466
ACT	75	428	700	42	33	292	136

Source: Dunlop et al. (2000)

In Queensland, the largest area of irrigated land is in the South East, mainly under crops (Table 3). Relatively less irrigated water is used also for high-value and performance-efficiency horticultural crops and pulses. Other major water users — for sugar cane and cotton — are produced on fairly well-controlled irrigation systems whilst almost all pastures

and grains are rain-fed. The average rainfall difference with the other three larger irrigated states is not great. However, Queensland has higher evaporation rates.

Also in terms of enterprise mix, Queensland irrigates mainly high-value enterprises (horticulture, cotton and sugar cane) compared to mainly pasture in both New South Wales and Victoria. Water usage varies according to crop type and water requirements. Rice, for instance, has by far the highest application rates (10.9 ML/ha), with sugar and horticulture following in a range between 7–10 ML/ha (Table 1).

**Table 3. Major irrigation areas in Queensland (average rainfall 608 mm)**

Region	Number of farms	Area irrigated (ha)	Deliveries (GL)
North	599	48	306
Central	717	31	106
South East	4,810	103	276
South	670	56	181
TOTAL	6,796	238	869

Source: DNR (1997)

**Table 4. Estimated distribution of water use in Queensland**

	Major Water Use Areas	Qld Coast (%)	Murray Darling Basin (%)	Lake Eyre (%)	Capentaria Cape York (%)	Total Qld (%)
URBAN	Total*	16	1	0	5	22
RURAL	Pasture	4	0	0	1	5
	Crops	51	5	0	3	59
	Horticulture	4	0	0	1	5
	Stock and domestic	3	3	2	1	9
	Total	62	8	2	6	78

\* Total Urban use includes Parks, Mining, Industry, Energy and Services

Source: Dunlop et al. (2000)

### **RWUEI in the Community Engagement Process**

Throughout this paper, the phrase *community engagement* is used to reflect on RWUEI's active involvement with the Queensland irrigation industry (its irrigation community and stakeholders) to achieve improvements in irrigation efficiency across all the major irrigation bodies of dairy and lucerne, cotton and grains, horticulture and sugar cane. Also, by focusing

water use efficiency (dollar returns per unit volume of resource used) directly at farm level, RWUEI was able to engage and involve irrigators to work together with field extension staff to help them with their usual irrigation management practices and improve their performance. Jointly, they identified areas of water use efficiency improvements to be made on the farm property, and required support (in the form of skills and knowledge and subsidies) was provided accordingly. RWUEI therefore applied a wide range of ways of irrigator involvement including:

- providing new information on better water use
- using consultation processes for joint planning, approval and decision making
- allowing active participation
- capacity building through strategic education and training
- operating collaboratively and in partnerships with irrigators.

Engagement processes were also largely:

- participative — practical, hands-on, joint activities
- demonstrative — on-farm training, education and learning
- on-farm — local, based on grower's conditions and real
- consultative — extension service, communication.

Finally, activities were predominantly hands-on, educative and collaborative. Planning and decision-making were done on collective, consultative and shared manner; with open discussion and understanding amongst members.

### **RWUEI Stocktake (1999) and Project Evaluations**

At the beginning of the RWUEI (June 1999), an independent stocktake was undertaken by a privately contracted firm (Barraclough & Co. (Aust) Pty Ltd) to establish (evaluate) the status of water use in the irrigation industry at the time to compare with the project's outcomes at the end of the four years (Phase I). In this baseline report it was also reported that about 60 per cent of the water on Queensland farms is used for crop and/or pasture production, with the balance (40 per cent) lost to runoff, drainage and/or evaporation. The very suggestion was therefore that even if the initial targets set by the industries were achieved, there would "...still be opportunity for further improvement, with nearly as much as 500,000ML still being lost; thereby giving potential for more achievements...".

Together with the irrigation industry bodies, targets and outcomes for RWUEI at this phase I were projected as:

- an annual saving of 180,000 ML with a potential increase in agricultural production of \$280m a year across the four industries
- creation of 1600 jobs — mainly in rural Queensland
- improved farm profitability and viability of Queensland's rural industries

- reduced runoff and drainage of contaminants like pesticides, salts and nutrients into rivers, aquifers and streams.

Finally at the end of four years (June 2003), another independent evaluator (J&R Coutts Pty Ltd) was hired by the government to conduct both the mid-term and final review reports of the program to determine its performance in achieving the intended outcomes.

### **RWUEI's Strategies and Strengths**

Projects usually operate with set goals and strategies for achieving them. RWUEI's had its strategies built upon fundamental principles of efficient water use at farm level, thus directly involving the irrigators and their activities on the farm, and the strategies were set up on:

- direct focus on WUE improvements on the farm
- use of participative techniques
- encouraging industry ownership through capacity building, support and setting of performance targets
- demonstrated results through on-farm trials, demonstrations, benchmarking and best management practices
- demonstrated improvement in productivity, economic performance and rural employment
- whole-farm approach (integrated management)
- accelerated adoption of proven practices and technology, training and education
- improvements in environmental management.

The organisational structure of the RWUEI also provided the project with outstanding strengths and capacity to pursue its targeted goals and outcomes. This unique model comprised five main elements:

#### 1. Partnership with industry representative bodies

Through the industries' representative bodies, the Department of Natural Resources and Mines was able to engage, negotiate and contract with the four major participating industry bodies (dairy and lucerne, cotton and grains, horticulture and sugar cane) in regard to outcomes to be achieved under the expected conditions. Each of these bodies represented its growers in the project's central advisory committee that regularly reviewed and assessed the performance of RWUEI, and made responsible adjustments and recommendations. Each industry body was also responsible for administering and coordinating its activities including staff and approval of R&D projects and trials, and supervising its part of the Financial Initiatives Scheme (FIS).

#### 2. On-farm trials and R&D projects

Farm trials and R&D projects were jointly developed with growers under local and regional conditions and then conducted by the growers with the help and facilitation of the field extension officers. Whereas trials looked at individual farm and property issues, R&D projects

were more regionally based. Approval of both trials and R&D projects were through collective decision-making by the growers in the region with advisory support from the extension officers.

### 3. Extension and advisory mix — working under Adoption Program

Perhaps the most significant feature in the RWUEI Adoption Program was the development of RWUEI field officers as a 'special' human resource to focus directly on improvements in on-farm water use efficiency. These officers worked tirelessly together with growers, setting up trials in their own properties, monitoring and collecting data, analysing, interpreting and promoting it for adoption everyone else as the appropriate irrigation techniques for the area under the local conditions. The Adoption Program used some of the available funds to train irrigation field officers (WUE Development Extension Officers or DEOs) to work alongside the irrigators to “develop an awareness of the need for improved water efficiency; understand and monitor their own irrigation systems better; become aware of alternatives and their cost/efficiency implications; and to assist in moving to improved systems”.

A total of 26 trained extension officers were appointed across the state by the participating irrigation industries (dairy and lucerne, cotton and grains, horticulture and sugar cane), each operating under the supervision of, and reporting to, its industry body. The presence of these field officers, coordinated across the industry bodies and with a high level of understanding of on-farm irrigation, measurement and improvement options, were a significant human resource asset to each industry.

The extension service therefore approached its tasks through a strong mix of complementary methods and activities that included locally based on-farm trials and research, clearly set goals and targets, financial assistance, goals, incentives, strong industry–government partnership and high level of regional industry involvement and ownership. A strong presence of on-farm training, group meetings and discussions, demonstrations and farm tours, road shows and workshops, and competition awards all contributed greatly to the overall success of the program. Such a mix of activities maximised the opportunity for a range of irrigators to become involved in WUE activities, adding momentum to the Adoption Program.

### 4. Financial Incentives Scheme (FIS)

The Financial Incentives Scheme was a significant component of the RWUEI, providing direct financial assistance and support to growers for accelerated adoption of new irrigation practices. Incentives were strategically targeted at items or activities that led to immediate change such as the purchase of equipment, farm restructuring (leveling) and design, development of water management plans, on-farm storage and channel improvements, and educational tours. Again the FIS was managed through each industry body facilitated by the extension officers.

The funds provided under the scheme have been extremely effective in assisting farmers to implement irrigation system improvements where costs may otherwise have discouraged them. The FIS also has been an education process, strategically directed and targeted towards equipment and practices that farmers were largely unaware of and which gave significant improvements in water use efficiency. Growers appreciated and acknowledged the government assistance. For the suppliers, funds from the FIS certainly boosted demand for irrigation products, but more than that they provided the opportunity for both growers and suppliers to develop knowledge about these products and enabled growers to direct their investments to the right items for irrigation improvement. Particular items such as scheduling and metering equipment provided direct labour savings for growers by assisting them to automatically monitor weather and soil moisture changes.

The combination of R&D and FIS made the RWUEI even stronger. A cotton farmer (2001) reflected about the impact of financial incentives in the following manner: "...the fact that DNRM is putting real dollars, readily accessible, says that they are serious about helping (irrigators) improve — it really captures your attention..."

#### 5. Project/Program Evaluation

As a major stage in project management, the purpose of this part of the RWUEI was to (periodically and continually) monitor, assess and review the Initiative's performance. Project evaluation was conducted in a number of well coordinated ways across all the industry bodies and involving almost all growers. Internal processes included regular reports (monthly and annual milestones), regular surveys by the extension officers and direct farm visits and observations. External evaluation was comprised solely of independent consultant reports and surveys as already reported above. The other significant source of information was feedback from extension officers as they conducted their day-to-day activities together with growers on their farms.

#### **Engagement processes, activities and outcomes — with irrigation industry**

Queensland agriculture is dominated by four peak bodies of dairy and lucerne, cotton and grains, horticulture and sugar cane, and in its Phase I (first four years — 1999–2003), RWUEI (in conjunction with the water reform process) has been able to prove to be the single most successful motivator of change in the irrigation industry across the state. This unique innovative approach was based on principles, strategies and mechanisms that engaged irrigators at every level. These strategies were based on guiding principles and activities needed to address the needs of the various irrigation groups and participation based on their voluntary involvement and participation under their local conditions. Indeed, in the final evaluation report (June 2003), it summarised that "...the implementation of the RWUEI 4

year program has certainly made a significant contribution to Queensland rural industries in a number of ways...”

First and foremost has been the ability of all four industry bodies to achieve and even exceed the water use efficiency targets set at the beginning of the project (Table 6). These achievements were made by growers on their own farms — reflection of actual active grower participatory involvement in the program. In all, the potential value of additional production from estimated annual water savings of 133,482 ML could continue in the future or dollar value of \$198m per annum. Such direct dollar benefits to the irrigation industry (Table 5) are all the more impressive given that they were achieved against the backgrounds of drought, crop diseases, international effects on markets and industry restructuring.

The figures given in Table 5 are from RWUEI’s end of Phase I independent evaluation report and are the best estimates of irrigation water use to date by the industry bodies. Approximate water savings from the start of the project (1999) to the end (June 2003) are also given in the third column, whilst water use improvements are shown in the last column. The variety of methods used for data collection include farmer surveys, sample on-farm measurements and crop productivity – crop water factor analysis.

**Table 5. Estimated on-farm water use — RWUEI**

<b>Industry group</b>	<b>Estimated water use 1999 (ML)</b>	<b>Estimated water use 2003 (ML)</b>	<b>Savings Targets (modified) (ML)</b>	<b>Estimated water savings (ML)</b>	<b>Improvement (%)</b>
Sugar	1,211,000	1,180,725	18,165	30,275	2.50
Cotton and Grains	600,000	532,145	60,000	67,855	11.31
Dairy	330,000	299,420	14,817	30,580	9.27
Lucerne	175,455	162,855	33,000	12,600	7.18
Horticulture	274,493	263,420	7,500	11,073	4.03
<b>TOTAL</b>	<b>2,590,948</b>	<b>2,438,565</b>	<b>133,482</b>	<b>152,383</b>	<b>5.88</b>

Source: Coutts (2003)

The Initiative’s final evaluation report (Coutts 2003) has also determined that 152,383 ML/annum is a conservative estimate of the water savings achieved. The report notes that an optimistic estimate could be as high as 475,000 ML/annum. The original unmodified target for the Initiative was 180,000 ML/annum.

**Table 6. Changes in water use efficiency**

Industry	Water use estimates at start of project	Target improvement to WUE		Milestone reports improvements to WUE against original estimate		Independent survey improvements in WUE %
		ML	%	ML	%	
Sugar	1,211,000	18,165	1.5	30,275	2.5	16.5
Cotton and Grains	600,000	60,000	10	67,855	11.3	12.3
Horticulture	274,493	7,500	30	11,073	4.0	31.5
Dairy	330,000	14,817	5.0	30,580	9.2	26.9
Lucerne	175,455	33,000	19.0	12,600	7.14	15.3

Source: Coutts (2003)

Support to the above point is highlighted by the actual level of participation and involvement by growers in the RWUEI program across the state (Table 7) and actual changes in water use efficiency also reported in Table 6 across all the industry bodies. It reflects not just high level of awareness irrigators had for the program, but their actual participation in the activities involved, particularly in the adoption processes of improved irrigation practices. This is in itself evidence of the good relationships developed during the program between the government and growers in various ways right across the project cycle (planning, implementation and evaluation). The various program activities are also outlined in Table 12.

**Table 7. Participation and involvement**

Industry	Milestones report (% involvement)	Independent survey report (% involvement)
Sugar	92	75
Cotton and Grains	78	76
Horticulture	80-90	70
Dairy and Lucerne	72	70

Source: Coutts (2003)

NB: Referring specifically to the horticulture industry during the 2001-2002 season, almost 45 per cent of horticultural growers across the state “have participated in the program to date – with awareness of the program at around 80%” (Coutts 2002). Also, more than 50 per cent had made changes to their irrigation systems in the previous two years. Of these, two-thirds of their changes had been influenced in some way by the Water for Profit program — the extension arm of the Queensland Fruit and Vegetable Growers’ RWUEI project. Coutts (2003) says that “...the fact that all participation was by voluntary basis, including provision of

experimental sites for trials, R&D projects and serving in the local discussion or focus groups further signifies how the program was valued with a real sense of ownership...”.

Table 8 indicates the significance of such the high grower participation in the program that, most likely, led to changes in irrigation practices over the period, whilst Table 9 indicates how information from the program influenced decision-making — hence the ability to make such changes. Table 9 also illustrates the momentum for change that certainly developed across the industries, while the key strategy was to operate at farm level. By focusing on the farm, RWUEI directly engaged with growers to implement changes right at property level — a point highlighted by the final evaluation report (Coutts 2003) that RWUEI was “...the only program in the State ever to target irrigation management at farm level...”.

**Table 8. Proportion of growers undertaking changes in irrigation practices**

<b>Main income</b>	<b>Changes in past 3-4 years (%)</b>	<b>Changes intended in next 2 years (%)</b>	<b>Has made changes and intends to continue (%)</b>	<b>Total respondents</b>
Sugar	88	65	59	68
Cotton and Grains	100	90	90	30
Lucerne	78	56	50	18
Dairy	90	60	60	30
Horticulture	89	53	49	47

Source: Coutts (2003)

**Table 9. Extent to which involvement in RWUEI has led to changes in understanding, knowledge and thinking**

<b>Main income</b>	<b>Not at all (%)</b>	<b>A little (%)</b>	<b>Moderate amount (%)</b>	<b>A lot (%)</b>	<b>Total respondents</b>	<b>Moderate and a lot (%)</b>
Sugar	18	26	33	23	66	56
Cotton and Grains	10	17	45	28	29	73
Lucerne	39	17	17	28	18	45
Dairy	10	33	40	17	30	57
Horticulture	23	23	28	26	47	54

Source: Coutts (2003)

**Table 10. Influence of or information by the RWUEI on decision-making and ability to make such changes**

<b>Main income</b>	<b>Not at all (%)</b>	<b>A little (%)</b>	<b>Moderate amount (%)</b>	<b>A lot (%)</b>	<b>Total respondents</b>	<b>Moderate and a lot (%)</b>
Sugar	15	31	31	23	52	54
Cotton and Grains	21	34	34	10	29	44
Lucerne	25	8	50	17	12	67
Dairy	12	16	40	32	25	72
Horticulture	29	26	20	26	35	46

Source: Coutts (2003)

Another outstanding part of RWUEI engagement with growers was in not just actual identification of possible areas of water use improvement on their farms but also their capacity to achieve real WUE changes. Many individual irrigators across the four industry bodies made definite WUE improvements against the targets they had set at the beginning of the project and their successes encouraged others to get involved in the program. Tables 5, 9 and 10 all report some of this information.

An extremely important focus of the Initiative also was to promote the Best Management Practice (BMP) approach across the industry bodies. In terms of WUE, the BMPs approach directly challenged growers to adopt the techniques that were considered as standard or at least acceptable across each industry by the local conditions. In Table 11, grower participation in the BMP process is shown to have been very high — at 70 per cent and beyond — thus directly matching the RWUEI's anticipated levels of performance with water use. These numbers were derived from direct sources such as actual, observed changes to irrigation systems and practices on farms, deliberate surveys and interviews, and levels of interest in attending functions that relate to improved practices as field days, on-farm demonstrations, farm walks and visits and even workshops. Prizes and awards were also at times attached to the BMP process to boost the adoption of the process and these high numbers also illustrate the potential for growers to continually improve their on-farm water usage into the future.

**Table 11. Adoption of Best Management Practices**

<b>Industry</b>	<b>Target % growers at BMP program</b>	<b>Milestone reports % growers at BMP program</b>	<b>Independent survey % growers at BMP program</b>
Sugar	70	85	68
Cotton and Grains	70	78	80
Horticulture	40	45	70
Dairy	40	49	69
Lucerne		42	73

NB: The BMP program was a strong component of the project in all four leading irrigation industry groups

Source: Coutts (2003)

Perhaps the most significant feature of all (with the RWUEI project) was the generation of development field extension officers, whose working relationships with growers proved so successful that they have become recognised as local 'water use experts'. Many of these staff remained with the program for all of the four years of Phase 1 and worked long days to set up joint trials with (co-operator) growers in their own farms, collect the data, analyse and report back to the rest of the growers for application. Growers developed confidence in skills and knowledge of these officers and they won their admiration for the efforts and the one-to-one service they rendered wherever possible. Once again, these activities involved direct engagement with irrigator groups.

**Table 12. Variety of activities across the industry bodies**

Type	Activities
Consultation	Regional management groups Advisory Committee
Mass communication	Mail-outs, radio, tv, notices and reports, fact sheets, video, CD-based irrigation resource kits etc
Extension, education, advisory	Field days, on-farm visits, information days
Training	Workshops, CRC training courses, LWMP workshops, compass workshops, seminars,
Discussion opportunities	Discussion groups, shed meetings
On-site group visits	Benchmarking, equipment installation and testing
On-on-one farm visits	tours
Demonstrations	On-farm demonstration sites
Research	On-farm trials and R&D projects
Encouragement	Awards, prizes, Financial incentives

Source: Coutts (2003)

NB: Other activities jointly conducted with growers can be summarised to include:

- group meetings and discussions
- joint approval, setting up and conducting of on-farm trials demonstration sites
- education and training in various forms — workshops, seminars, and information sessions
- field days, farm tours, walks and visits
- establishment of regional management or reference groups
- conducting grower meetings and discussion groups
- data collection, analysis and adopting new findings as new techniques
- benchmarking and surveying WUE information
- testing farmer (irrigation) equipment on the farm and assessing performance
- training in and developing irrigation and property management plans, regional and crop irrigation models
- training in basic water auditing on the farm and adoption of BMP packages
- training in self-evaluation exercises and developing work books
- developing industry policy on minimum standards
- promoting (irrigation management) information recording systems
- provision of technical specialist services to growers and by participatory approach
- testing and promoting on-farm water storage systems and reduction of losses
- developing and promoting information dissemination systems for information
- sharing (such as newsletters, updates, etc.)
- encouraging growers to share equipment and information (e.g. weather stations, moisture monitors, etc.)

Prizes and awards were useful in both identifying the best performers and provide acknowledgement for their efforts. These competitions became extremely popular; boosting the morale of the winners and making them recognised amongst their colleagues. They were held at different levels within and across the industries, creating another avenue for information to be shared between industries.

Much of the information promoted by the RWUEI extension officers was based on information developed from on-farm trials. Some also came from the R&D projects with data being collected at a broader and more regional basis. Over the four years of Phase I, many trials were conducted across the industry bodies with a massive amount of data collected by each industry body. Some of the trial categories and R&D projects are listed in Table 13. There were altogether ten R&D projects and over 50 trials conducted over the four years (an average of four per season per industry body). The information is discussed freely within the grower groups to be shared and promoted as recommended practices for the region. It was always important to attach an immediate (follow-up) education and training to the findings from trials and R&D projects to facilitate rapid adoption and also identify appropriate methods for implementation. Maintaining that openness between growers and the extension officers as they worked together was also imperative. The information developed through the Initiative of course remains with the industry bodies but continues to be used and accessed by their members to improve WUE on their farms.

**Table 13. RWUEI trials and R&D projects**

Trials	R&D projects
<ul style="list-style-type: none"> <li>• Irrigation in different soil types</li> <li>• Measuring infiltration rates</li> <li>• Seepage, leakage and evaporation in farm dams and channels</li> <li>• Deficit irrigation</li> <li>• Scheduling</li> <li>• Benchmarking</li> <li>• Systems performance</li> <li>• Weather monitoring</li> <li>• Runoff and erosion control</li> <li>• Water quality and environmental protection</li> <li>• Water advance rates</li> <li>• Data collection and logging</li> </ul>	<ul style="list-style-type: none"> <li>• Increased profitability and WUE through best use of limited water</li> <li>• Tool kit to evaluate and improve performance of sprinkler systems</li> <li>• Improved efficiency in furrow irrigation</li> <li>• Trickle irrigation in heavy clay soils</li> <li>• Management of furrow irrigation to sustain groundwater resources</li> <li>• Adoption of improved irrigation practices for vegetable production</li> <li>• Sustainable horticultural irrigation</li> <li>• Best irrigation strategies under limited water</li> <li>• Sustainable irrigation planning for the Burdekin Delta soils</li> <li>• Short-term climate forecasting and risk management to improve WUE and irrigation scheduling</li> </ul>

Source: Coutts (2003)

The Financial Incentives Scheme (FIS) was probably the greatest stimulus for the quick adoption of the new irrigation practices across all the industry groups — hence engaging irrigators into the adoption process. With direct assistance from government, growers were encouraged to move to new water efficient irrigation practices that enhanced productivity and profitability. FIS further boosted investment in the industry itself through commercial sales of items and services by suppliers and consultants and also greatly improved understanding of both the growers and suppliers. These aspects are reflected in Tables 14 and 15.

**Table 14. Use of Financial Incentives Scheme (FIS) by irrigators**

	Cotton and Grains (\$)	Dairy, Lucerne and Pasture (\$)	Horticulture (\$)	Sugar (\$)
Total number of irrigators	558 (42%)	699 (68%)	1438 (41%)	1893 (63%)
Total \$	4,354,666	5,549,934	6,956,889	14,556,502

Source: Coutts (2003)

According to Table 14, over 40 per cent of the growers obtained funding through the Financial Incentives Scheme with total payouts exceeding \$10 million. Each \$1 invested by government attracted a further \$3 from growers, giving a total estimate of \$33 million invested in water efficient irrigation across all industry bodies — reflecting a very high and successful engagement rate indeed.

**Table 15. Importance of Financial Incentives Scheme (FIS) in making changes to irrigation management**

Main income	Not at all (%)	A little (%)	Moderate amount (%)	A lot (%)	Total respondents	Moderate and a lot (%)
Sugar	3	23	30	43		73
Cotton and Grains	7	7	29	57		86
Lucerne	14	14	57	14		71
Dairy	0	6	31	63		94
Horticulture	0	0	32	68		100

Source: Coutts (2003)

Another area of great engagement by irrigators in the RWUEI (program) was communication — sharing information, access and networking — where they previously did not exist. By the end of Phase I, each industry body had its own website for the members to access or distribute information, including regular service and distribution of print material in the form of reports or updates, fact sheets, newsletters or even published papers. Specific industry websites are:

<<http://www.canegrowers.com.au>>, <<http://dairypage.com.au>>, <<http://www.qfvg.org.au>> and <<http://www.cottonaustralia.com.au>> but information can also be reached by visiting the RWUEI's general website <<http://www.nrm.qld.gov.au/rwue>>.

Also in the Initiative's projected targets, there was intended hope to create and increasing job opportunities in the irrigated agriculture sector. According to the final evaluation report and interpolating from the water that was saved, RWUEI was actually able to not only retain but as well create jobs in the rural areas (Tables 6 and 16). Many growers today acknowledge the need for a separate manager or consultant for irrigation (farm water) management alone, where as previously water management was done by self or a crop agronomist. This is further evidence for advancement in the recognition for the value of water by the growers, positive impact of the Initiative and contribution to job opportunities.

**Table 16. Creation of jobs in industry and rural regions**

Industry	GL gained a year	Jobs per GL	Total estimated jobs
Sugar	30.275	2.75	83
Cotton and Grains	67.855	2.75	187
Horticulture	11.073	30	332
Dairy	30.580	15	459
Lucerne	12.600	2.75	34
Total	152.383		1095

Source: Coutts (2003)

**Table 17. Estimated financial benefits to industries**

Industry	Target industry gains (\$m)	Gains calculated from milestone reports (\$m)	Gains using multipliers in the original Barraclough table (\$m)	Gains based on % improvements from grower survey (\$m)
Sugar	22	9.7	9.2	64
Cotton and Grains	27	57	30.5	62
Horticulture	37	113.3	27.3	884.7
Dairy	8.5	7.3	7.9	21.2
Lucerne	3.4	10.4	4.6	22.1
Total	97.9	197.7	79.5	1054

Source: Coutts (2003)

The RWUEI Adoption Program also undertook demonstration of innovative approaches to WUE improvements on particular issues requested by growers such as choice, design and management of systems to match required irrigation operations. These demonstrations were mainly of the hands-on-type on their properties during events such as field days or farm tours. Growers usually preferred the hands-on (more practical-based) approach finding it to be more realistic and relevant.

### Conclusion

By the end of Phase I (June 2003) RWUEI had already surpassed its projected targets and intended outcomes by a great margin. Much of this achievement can be attributed to engagement (participatory) approach that was applied to directly involve growers in their

routine farm irrigation activities and assist them in adopting better practices. Participatory rates (in most cases) were reported at 70 to 90 per cent — enabling irrigators to develop increased capacity to better manage their irrigation through the program. Hands-on (on-farm) education and training in particular, assisted irrigators in making (individual) changes towards Best Practice Management whilst encouraging community understanding and industry ownership. Grower training and education were carried out by teams of able ‘irrigation experts’ — field extension staff who conducted and demonstrated the required activities right on the farms with irrigators, applying their own data, equipment and most of the time within familiar groups, with the result that growers felt comfortable discussing and sharing ideas.

The irrigation industry bodies across the state have also demonstrated an unfailing commitment to addressing significant major challenges during the program and have successfully continued to meet key challenges that face the water industry today (such as drought, and water shortages in general) along the lines of rural water use efficiency. These industry bodies have learned to share information among their own members and with each other through various networks including websites). Direct financial support from government (financial incentives) was certainly a trigger in the rapid adoption process and an extra dimension was made on water value — not only as a natural resource but also economic item — thus even enabling jobs to be retained and created in the rural areas. With such positive outcomes, RWUEI has been able to develop a reputation with the irrigation industry and achieve results to be used against a background of challenges such as drought, deregulation and a declining world market, and the opportunities offered by water reform.

RWUEI’s partnership model between government and the rural industry has certainly continued to be resounded as a winner. It has led to the program’s extension for a further two years as Phase 2 (up to June 2005) with perhaps a likelihood to continue. The picture emerging from the collated and analysed data is that of “a well targeted, very integrated intervention program that was highly successful despite pressures of drought, deregulation and initial low interest”. Key activities in the RWUEI program were consultation, education, training and communication. Key elements were field extension staff, financial incentives and field trials together with R&D projects. This was recognised by ANCID (Australian National Committee for Irrigation and Drainage) when it awarded the program its national award for 2002-03 for “effective working relationships in the water industry”.

A video outlining the RWUEI program has been produced in which various people including growers across the four major irrigation industry bodies were interviewed about their involvement with the RWUEI during its first four years. Issues such as the program’s initiation and the ongoing acceptance by the industry bodies have been captured and a copy may be obtained by contacting the NRM&E office in Brisbane.

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