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QUEENSLAND'S RURAL WATER USE  
EFFICIENCY INITIATIVE

by  
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# QUEENSLAND'S RURAL WATER USE EFFICIENCY INITIATIVE

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## ABSTRACT

This paper outlines a \$A41 million program, the **Rural Water Use Efficiency Initiative** run by the Queensland Department of Natural Resources and Mines, Queensland, Australia, to improve the efficiency of use of rural water for irrigation in Queensland. Irrigation accounts for about 70% of water in Queensland and because the limits to the resource are becoming defined, it is increasingly important to use water efficiently.

The Initiative is unique in Australia, utilising partnerships between the government and the key irrigation industry commodity groups, sugar; fruit and vegetables, dairy; lucerne and pasture; and cotton and grains to deliver natural resource outcomes.

The program has a number of sub-components: adoption, research and development, financial incentives, and also addresses losses from farm storages and State water distribution systems.

The successes and achievements of the program are highlighted. Information is also provided on how the program was developed, its structure and how the benefits are assessed.

## OVERVIEW OF QUEENSLAND'S RURAL WATER USE EFFICIENCY INITIATIVE

Water is used by all sectors of the community. It is vital to nearly all industries, especially rural industries which make an important contribution to many regional communities. Queensland's water resources are limited and we need to make the best use of them.

The community's water use needs are met through three approaches:

- a) improving the efficiency with which water is used (water use efficiency).
- b) recycling water which has already been used (wastewater reuse).
- c) making additional water supplies available through the construction of new water supply infrastructure, such as dams and weirs.

All three methods are being used, although in the past most emphasis has been placed on the third option. While the construction of new, economically viable and ecologically sustainable water supply infrastructure will continue where water is available for this purpose, more emphasis will be placed in future on water use efficiency and wastewater reuse.

This paper outlines a major Queensland Government initiative known as the Rural Water Use Efficiency Initiative to improve irrigation water use efficiency in the State's rural sector. This four-year program which commenced in 1999 and which will conclude in June 2003 is managed by the Department of Natural Resources and Mines (NR&M) in partnership with rural industry organisations.

## **BENEFITS OF THE RURAL WATER USE EFFICIENCY INITIATIVE**

The Initiative is a partnership between industry and government to improve the use and management of available irrigation water, thereby improving the competitiveness, profitability and environmental sustainability of Queensland's rural industries.

### **Key benefits of the Initiative are:**

1. by 1 July 2003, an increase in agricultural production of \$280 million (equivalent to what would be achieved by supplying an additional 180 000 megalitres of irrigation water annually)
2. the creation of 1 600 jobs in regional Queensland
3. improved farm profitability and viability of Queensland's rural industries
4. reduced run-off of pesticides and nutrients into rivers and streams.

### **The four major elements of the Initiative are:**

1. Adoption programs to improve water use efficiency on farms
2. Reducing water losses from storages on farms
3. Financial incentives to achieve best practice irrigation water management
4. Reducing water losses in irrigation water supply and distribution systems

Over four years, \$41 million is being spent on the Initiative, with \$23 million spent on adoption (extension) programs to improve water use efficiency on farms including \$3 million for R&D. \$12 million is being provided under the Financial Incentives Program, with the balance being spent on the Initiative's remaining elements, which are evolving during the program.

The additional water which will become available to farmers as a result of implementing water use efficiency can either be used by them for increased agricultural production or they can sell it to other water users once the relevant changes to water industry legislation are made.

The Initiative is guided by an advisory committee comprised of representatives from the Department of Natural Resources and Mines, rural industry organisations, government agencies, the Queensland Conservation Council and the Irrigation Association of Australia which together oversee the implementation of the Initiative.

### **Adoption programs to improve water use efficiency on farms**

These programs are designed to assist farmers achieve best practice in irrigation water management on their properties, thereby improving profitability and sustainability. Over 4 years, \$23 million are being spent on these programs and associated research and development (R&D) activities.

### ***The key points of the adoption programs are:***

- the programs are managed by rural industry organisations: CaneGrowers for sugarcane; Cotton Australia for cotton and grains; Queensland Dairyfarmers' Organisation for dairy lucerne and pasture and Queensland Fruit & Vegetable Growers for horticulture. Each organisation involves farmers in the design and implementation of its adoption program.

- participation by individual farmers in the programs is voluntary and is not confined only to those farmers supplied with irrigation water by NR&M.
- annual targets for each adoption program have been negotiated between NR&M and the relevant industry organisation. The target will cover such matters as:
  - the percentage of farmers achieving best practice irrigation water management and
  - the percentage improvement in average farm irrigation water use efficiency.
- these targets have been set following comprehensive ‘stocktakes’ of existing irrigation practices and identification of cost-effective opportunities for improvements.

The adoption program is supported by 10 R&D projects selected to provide critical information to the four industry partners to identify and assist their progress towards best practice. Approximately \$1 million per year is being provided to fund this R&D activity.

***Other aspects of the adoption programs include:***

- best practice irrigation water management codes for each industry (and region) will be developed and reviewed by that industry.
- linkages have been established by NR&M and the industry organisations between all of the adoption programs, and supporting activities, to minimise duplication of effort and ensure the timely transfer of knowledge between programs.
- short, industry-sponsored training courses and on farm demonstrations in the optimal use of irrigation equipment and techniques have been developed and are being run by the industries to meet the identified needs of farmers.
- existing water use efficiency levels on farms will be measured, as will changes following implementation of the adoption programs. The performance of individual farmers will not be made publicly available, but aggregate measures of performance will be published for each adoption program.

**Reducing water losses from storages on farms**

Irrigation water is often stored in farm dams and ring tanks. There are more than 5 000 of these structures storing approximately 1 000 000 ML.

Some of these storages are being built to less than their economically optimum height to minimise evaporation, which can amount to up to 40% in the cotton industry. In addition, inadequate construction standards can lead to excess seepage or even embankment failure and resultant water loss.

Guidelines for best practice construction are being prepared to ensure that farmers have access to information that will ensure that losses from on farm storages will be minimised.

Evaporation losses from farm storages are being addressed by a range of measures including determining optimum storage depth, the use of dividing walls to provide cells and by investigating and testing a range of plastic covers which can drastically reduce evaporation.

A range of decision support tools is being developed to assist farmers in making informed choices in the planning of their future water resources needs and how best to procure them.

## **Financial incentives to implement best practice irrigation water management**

Financial incentives programs to assist farmers achieve best practice irrigation water management are being implemented with \$12 million being provided to farmers to improve their irrigation systems. The program is industry managed within an agreed framework with each industry largely determining the measures that will be provided under each of their specifically tailored programs.

Irrigators have embraced the scheme contributing \$3 in cash for improvements for every \$1 contributed by government. At that rate of private contribution, farmers will actually contribute an amount at least equivalent to the total government contribution of \$41 million during the life of the program.

## **Reducing water losses in bulk irrigation water supply and distribution systems**

Controllable water losses can occur in the water storage and distribution systems of irrigation water service providers such as SunWater which is the State's major corporate water service provider.

Funding has been provided to complete investigation of all SunWater's schemes and projects to identify the extent of current operational losses including recommendations for minimising these losses.

Financial assistance may be provided towards the cost of undertaking, on a voluntary basis, similar studies for other Queensland irrigation water service providers with an annual throughput exceeding 10 000 ML, and servicing 10 or more customers, where cost-effective opportunities to reduce water losses are likely to exist.

## **Evaluation**

The Rural Water Use Efficiency Initiative partnership is based on contracts between government and industry setting out annual and end of program targets that are required to be met before progress payments are made. Each year, the industries prepare project reports addressing comprehensive milestone criteria. The milestone targets which have been set at the beginning of the program following industry stocktakes are assessed by common processes and definitions across all industries so that the results can be amalgamated to provide a whole of program result which can be compared with the whole of program targets.

A review and evaluation process which is undertaken by independent consultants at both the mid-term and end of the project is a key feature of the program. The aim of these evaluations is to ascertain progress and to provide comment on ways of improving the delivery of the program.

A "synergy analysis" has been completed to determine the extent to which any of the gains that are measured are attributable to the program. The results show that the Rural Water Use Efficiency Initiative is by far the main factor influencing change.

The program utilises the services of an economist to translate the information on water use efficiency and BMP gains into financial gains for the industries and the State including other gains such as jobs created and environmental benefits.

## **Achievements of the Rural Water Use Efficiency Initiative**

The following are some short statements of success provided by each of the partner industries.

## **QUEENSLAND SUGAR INDUSTRY**

### **Objective**

Increase irrigation efficiency by at least 6% and have 70% of irrigators adopting irrigation Best Management Practices specific to their region.

### **Achievements**

- Achieved all milestone targets for 2002 and have also exceeded end of project targets for most key objectives.
  - ⇒ 86% of irrigated cane growers participated in program across Queensland
  - ⇒ 80% of growers substantially met irrigation Best Management Practices
  - ⇒ Productivity increase to 8.7 t/ML from 8.5 t/ML in 1999-2000. This compares to a target of 8.6 t/ML for 2003 and equates to a water saving of around 50 000 ML and an extra \$40 Million of cane production per year.
- Expect productivity to increase by a further 0.5 t/ML in 2003 and 2004 after the program has finished. This equates to a further water saving of around 40 000 ML and extra cane production of \$32 Million per year.
- Government has contributed \$2.4 Million in incentives to the sugar industry to date. As a result, cane growers have spent \$10.5 Million.
- On the Atherton Tablelands, the irrigation system changes component has been impressive with 22 growers, or almost 20% of growers, having received funding and purchased new low pressure and drip irrigation systems.
  - ⇒ 10-20% drop in water use of in 2002-03 as a result of the system changes.
- Increase from 7% Irrigation BMP for management systems in 2001 to 59% in 2002 for the Burdekin region
  - ⇒ Increase uptake in weather stations, irrigation scheduling and bore testing
- Increase from 5% Irrigation BMP for management systems in 2001 to 56% in 2002 for the Bundaberg region
- Increase from 56% Irrigation BMP for irrigation practices in 2001 to 93% in 2002 for the Maryborough region
  - ⇒ Predominant improvement in scheduling and management

## **QUEENSLAND COTTON AND GRAINS INDUSTRY**

### **Objective**

Increase irrigation efficiency by at least 10% (1.17 bales/ML to 1.29 bales/ML) and have 70% of irrigators adopting irrigation Best Management Practices.

### **Achievements**

- On track to achieve program objective by 2003
- 70 % participation and awareness of program across State.
- Some irrigators achieving 1.9 bales/ML irrigation efficiency
  - ⇒ 62% improvement in water use efficiency from initial stocktake
- Irrigator of the year achieved excellent result of 2.9 bales/ML
  - ⇒ 147% difference from stocktake figure

- Management changes have resulted in better application efficiency (AE) and halves tailwater volumes and therefore reduces tailwater losses and minimising deep drainage
  - ⇒ Improvement of 34% AE from 47% to 63%
- Water should only be on the field long enough for the soil moisture profile to be replenished.
  - ⇒ Yield increases are expected due to 40% decrease in water logging duration over entire growing season.
- Laser levelling of irrigation fields has improved irrigation uniformity to reduce waterlogging, resulting in increased yields from 7.2 bales/hectare to 8.6 bales/hectare
  - ⇒ Yield increase of 19%
- Floating dam covers indicate water savings of up to 40% lost through evaporation in ringtanks

## **QUEENSLAND DAIRY AND LUCERNE INDUSTRY**

### **Objective**

Increase irrigation efficiency by at least 11% on irrigated pasture and 6% on lucerne farms and have 40% of irrigators achieving irrigation Best Management Practices.

### **Achievements**

- On track to achieve program objectives
- The lucerne demonstration farms have reduced water use by an average of 0.8 ML/ha, which equates to an 8% decrease.
- Lucerne demonstration farms have increased production by 0.31 ton/ML to 2.61 tons/ML (a 12% increase). The 132 lucerne farmers surveyed have increase 0.46 tons/ML to 2.37 tons/ML.
- 72% of lucerne growers have had some involvement in BMP through the WUE project.
- The project has developed a client list of some 500 lucerne growers. Previously no contact details were available for the lucerne industry as it has no industry association.
- Dairy demonstration sites have measured up to 30% increase in WUE over the ryegrass season. This has been achieved through improving DU% (by 15%) and reducing the frequency of irrigation by scheduling.
- North Queensland is trailing a central weather station to provide evapotranspiration data for the Tablelands dairy industry. Information is being published in the local paper.
- The Dairying Better 'n' Better best management practice guidelines have been released on CD to farmers. 20% of dairy irrigators have attended training workshops on this decision support tool.
- Over 200 irrigation systems have been checked for Distribution Uniformity, cost of pumping and application amount. Pumping costs are on average 25% higher than the BMP guidelines and DU% of 15% above BMP guidelines. This represents a significant opportunity for individuals to improve WUE based on individual farm information.
- For the last five months every dairy farmer has received a detailed case study of a farm that has improved irrigation practice through the Dairy Time paper. This is on top of numerous articles in local and statewide media outlets.
- Over 500 farms have received grants from the FIS.
- Dairy industry ran a very successful study tour with 45 farmers travelling interstate.

## QUEENSLAND FRUIT AND VEGETABLE INDUSTRY

### Objective

Increase water use efficiency by 11%, improve productivity increase profit and reduce environmental impacts and have 40% of irrigators adopting irrigation Best Management Practices.

### Achievements

- On track to achieve program objectives
- 80% awareness and participation of program
- Over 50% of growers have made changes to their irrigation system with predominant influence from RWUEI
- 10% gains achieved on farm from changes to water savings and productivity gains (grower self estimate from statewide survey 2002)
- Achieved gains equivalent to \$115 Million in increasing irrigation efficiency
- 30% growers approved to date to access the Financial Incentive Scheme to assist in achieving Best Management Practices
- RWUEI has heightened the importance of irrigation efficiency on Horticultural irrigation farms, with growers making changes where they otherwise would not have.
- General comments from growers:
  - ⇒ “Rate it as a good way to model other adoption and extension models”
  - ⇒ “It’s nice to see someone using a carrot rather than a stick”
  - ⇒ “Most farmers shake when you mention “the government”, however I can honestly say this is one of the best programs I have been involved in.”
  - ⇒ “Irrigation efficiency will be improved greatly by the ability to save our limited amount of water.”
  - ⇒ “...To efficiently use the information gained from the use of the Diviner and Enviroscan Program purchased and installed during the first round of the RWUE scheme, we have changed our farming practices and irrigating patterns across all of our crops, so plan to move on to further increase this efficiency by.....improve drainage, prevent erosion...”
  - ⇒ “...It is planned to do most of the irrigating of our crops at night when the conditions are more favourable for an efficient job,.....This should result in higher yields and a higher quality product, produced at a more efficient cost.”

### Summary and Conclusion

The Rural Water Use Efficiency Initiative is a unique Australian initiative which is achieving significant success as a result of working in partnership with the main irrigation industry commodity groups. The program is on target to achieve its stated objective of providing the equivalent of 180,000 megalitres per annum of additional water for irrigation.

As a result of the success of the program, the Queensland government is examining the potential for continuing the Initiative and broadening the partnership approach into a generic model for addressing a more diverse range of natural resource issues.

**Web Site:** <http://www.nrm.qld.gov.au/rwue/>