

# Mary River Catchment

## Irrigation Water Use Efficiency

### FINAL SUBMISSION



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**Additional Material:** [Click on links below to access to documents](#)

- **Scoping Study** Warning - 5.7 MB download
- **On-Farm Performance Evaluations in the Dairy Sector**
- **Measuring Irrigation System Performance in the Queensland Dairy Industry**

## Introduction

The Mary River Valley has been facing increasing demands for water from urban, industrial, and rural water users. While it seems likely that additional water storage infrastructure will be required to meet future demands, the nature and timing of these developments will be a function of the demand. Improvements in the efficiency of current water users reduce both the current and future demands on the water resources. Hence, the identification and implementation of strategies to improve water use efficiency is a tangible way to reduce water demand and delay the costs associated with the construction of future infrastructure.

A substantial proportion of the water in the Mary Catchment is currently used for dairy, sugar and horticultural production. While a limited amount of irrigation research has been conducted by these industries in other areas, little was known regarding the relative efficiency of on-farm water use by these industries in the Mary River catchment. The lack of information regarding the performance of existing on-farm irrigation practices in this area has made it difficult to identify improved practices and effectively target irrigation extension programs. This also created problems for the accurate assessment of potential gains from improvements in water use efficiency.

## Project Summary

This project investigated the efficiency of on-farm water use in the Mary Valley catchment. The project involved a scoping study to identify the current on-farm water management practices of the major agricultural industries within the valley. The scoping study was followed by a monitoring and experimental program to evaluate the performance of the on-farm water management systems. The viability and potential improvements associated with alternative on-farm water management practices were also assessed.

This project focussed on the on-farm engineering aspects (e.g. on-farm storage, distribution, application and recycling efficiency) of irrigation performance and has developed recommendations for the targeting of future on-farm water use efficiency programs in the valley. The project has then developed techniques which could be used in the evaluation of on-farm irrigation efficiency in other catchments.

## Project Aims

The aim of the project was to identify the potential for improved irrigation efficiencies in the Mary River catchment. The specific project tasks included:

- (a) Undertaking a scoping study of agricultural water management and the potential for improved on-farm efficiencies within the catchment. This involved a desktop analysis of available water use data, a survey of irrigators, and consultation with industry stakeholders and DNR staff. The major outcome of this study was the evaluation of the potential for improved irrigation efficiencies and the identification of the agricultural sector where the greatest gains in irrigation efficiency could realistically be obtained;
- (b) Undertaking an on-farm monitoring and experimental program to evaluate whole farm water use efficiency for the agricultural sector identified in the scoping study as having the greatest potential for improvement. This involved the benchmarking of existing on-farm irrigation performance. Where possible, alternative management practices to improve irrigation efficiencies were also evaluated; *and*
- (c) Prepare a final project report detailing the results of the scoping and field program and make recommendations on the potential to improve on-farm irrigation efficiency with the catchment.

## **Operation Details**

This project was initiated in February 1999 in response to the need for quantitative research into irrigation water use in the Mary River Catchment. The Department of Natural Resources (Regional Infrastructure and Development) commissioned the project to be undertaken by the National Centre for Engineering in Agriculture at the University of Southern Queensland, Toowoomba. The first part of the project, the Scoping Study, was completed between March and August 1999.

Unfortunately, prolonged wet weather during the following 12 months resulted in few successful on-farm trials as most farmers were not irrigating. Significant trials were performed in the latter half of 2000, measuring distribution uniformity, traveller speed, pressure and flow for travelling irrigators, solid set and handshift systems.

## **Project Outcomes**

The major outputs of each component of the project have been separately reported in the attached documents:

- Scoping Irrigation Practices in the Mary River Catchment
- Benchmarking Irrigation Performance in the Mary River Catchment
- Measuring Irrigation System Performance in the Queensland Dairy Industry

The major outcomes of this work were:

### ***Scoping Study***

As far as establishing the future direction of the project, the key finding of the Scoping Study was that further research should be focussed on the dairy sector as the largest possibility for water and economic savings were in this sector.

- The dairy sector uses the largest proportion of irrigation water in the catchment and appears to have some of the highest rates of water application (ML/ha).
- The high variability in irrigation volumes applied suggests that there is a wide divergence of irrigation management practices in use within this sector.
- More than half of the irrigators in this sector recognise that their water use efficiency could be improved, either through the use of better scheduling techniques, application systems or management practices.
- The farmers in this sector are generally younger, better educated and appear more likely to adopt new technology than in the other sectors.
- The level of farmer knowledge regarding application technology and management practices is generally low, and irrigation scheduling is not widely used.

### ***Benchmarking Irrigation Performance***

Distribution uniformities were found to range from 1 % to 88 % for travelling irrigators and from 43 % to 72 % for solid set and hand shift systems. These ranges gave average distribution uniformities of 59 % and 62 % for the travelling and solid set systems respectively. These averages are very low when compared with acceptable target uniformity values. Of particular concern is the poor performance of solid set systems as in most cases the low performance is due to incorrect system design. This makes performance improvement of solid set systems both difficult and costly.

Pressure and flow variations were found to be minimal for the soft hose travelling irrigators tested, although pressure declined by an average of 16 % over the duration of a run for a hard hose irrigator. Traveller speed was found to vary considerably, with one test indicating a 50 % variation in speed about the mean. These variations would imply that significant non-uniformity may occur in the direction of travel which standard performance testing measures do not take account of.

***Measuring Irrigation System Performance – ‘The Toolkit’***

- A toolkit of methods has been produced to assist extension officers to undertake irrigation system performance research.
- The methods included are based on the in field research undertaken during the benchmarking phase of the project.
- As the systems tested were confined to travelling irrigators, solid set and handshift, the methods discussed are limited to the testing of these systems.