



**Land & Water  
Resources**  
Research &  
Development  
Corporation

National Program for  
Irrigation Research and Development:  
Discussion Paper for a Proposed  
Research Strategy

Occasional Paper No 02/93

**Occasional  
Paper  
Series**

*National Program for Irrigation R&D*

# Research Strategy Discussion Paper

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*Prepared for the  
Management Committee of the National Program  
for Irrigation R&D*

March 1993

Published by the Land & Water Resources Research & Development Corporation

Ph 06 257 3379 Fax 06 257 3420

ISSN 1320-0992

ISBN 0 642 19296 0

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## 1. Introduction

A February 1993 meeting of the Chief Executives from the Land and Water Resources Research and Development Corporation (LWRRDC), Rural Water Corporation of Victoria, NSW Department of Water Resources and Queensland Department of Primary Industries agreed to financially support the national program for irrigation R&D for three years. It is expected the annual \$1 million program will:

- provide a national focus for irrigation research;
- provide adequate funds to make a significant impact on long-term, generic irrigation issues;
- provide continuity of funding if required over three or more years rather than short-term, annual projects; and
- provide a mechanism for coordinating research and development activities across the States.

A working group consisting of Christine Forster (Chairperson), David Mittelheuser, Eddie Parr, John Cantor and Nick Schofield was established to prepare guidelines for the Program Management Committee based on the priorities established by the partner organisations and the published National Irrigation Research Fund (NIRF) Strategy. It was also required to indicate current irrigation R&D expertise.

It is suggested the Australian Irrigation Council could also play an important role in advising on research priorities and disseminating information on the program as well as sponsoring workshops to assist in project formulation. The former Board of the National Irrigation Research Fund and its subcommittees may also be a useful source of expertise and advice.

It is recommended that a substantial proportion of funds (say 75%) be allocated to large, well-resourced projects either directly commissioned or tendered to research groups with highest expertise, research and development capability, well established track record and which provide the best project proposals.

Encouragement should also be given to newly-established irrigation research centres, such as Charles Sturt University (Riverina) and the University of Western Sydney (Hawkesbury).

Commissioning and calls for research projects for 1993/94 should be underway by May 1993.

## 2. Objectives

In implementing the broad LWRDC policy, the irrigation program objectives are designed to accelerate and coordinate irrigation research in Australia and to improve irrigation technology transfer by:

- developing a strategic irrigation research and development program to enhance the sustainability of irrigated agriculture and address environmental issues that are currently limiting productivity and sustainability
- giving special priority to research with potential to provide a major boost to Australia's export earnings
- giving priority to practical on-farm irrigation and off-farm water management research, particularly that not covered by existing commodity funded research programs
- requiring that assisted research and development be energetically pursued to the earliest possible conclusion
- ensuring that research and development results are properly reviewed, appropriately published and promptly acted upon by governments, extension agencies and equipment manufacturers and suppliers
- identifying additional sources of funds which might be tapped for expansion of the irrigation research and development program.

## 3. Priorities

The priorities for the R&D program should be based on:

- improvement in productivity output and environmental sustainability;
- increased water use efficiency including both off and on-farm water management;
- drainage, pollution and salinity issues; and
- technology adoption and education.

## 4. Guidelines for Program Development

The NIRF Strategy developed national targets for change and priorities for action. This paper attempts to translate those actions into more specific projects for inclusion in a draft research program for consideration by the Management Committee.

In some cases it may be desirable to commission literature reviews to clearly identify relevant work that has been carried out in Australia and overseas. Workshops and panels may also be useful in the development and formulation of projects.

### 4.1 IMPROVING PRODUCTIVITY AND SUSTAINABILITY

- a) Adaptation of Property Management Planning (PMP) techniques to irrigated agriculture.

PMP integrates physical Whole Farm Plans, soil and water supply parameters with business management and risk assessment. A well-developed PMP process will enable irrigators to assess their supply security requirements and use of mechanisms such as Transferable Water Entitlements. It will enable them to strike the balance between productivity and sustainability and to insure for an identified risk. Technology transfer should also be integrated into the PMP process.

*A research project in this area could be carried out by a number of Agricultural Research agencies. This project should include use of climate predictions (long and short term) in irrigation management.*

*Development of decision support systems to optimise conjunctive use of surface and groundwater supplies would be very worthwhile. Such a system would need to recognise the importance of re-use systems and the impact of salinity and other pollutants on both shallow and deep aquifers.*

*It would be best to call for expressions of interest in such a project.*

- b) Development of innovative sustainable irrigated agricultural systems.

The program should have room for development of high value uses of irrigation and any projects which relate higher productivity to water application.

The Murray Darling Basin Commission Irrigation Management Strategy may well identify irrigation areas which ultimately have to be restructured.

*There may be scope to support pilot projects in this area in the 1994/95 program in order to develop restructuring mechanisms which result in maximising productivity of individual irrigation districts while taking into account social, environmental and economic costs.*

### 4.2 WATER USE EFFICIENCY AND WATER MANAGEMENT

Improvement in water management must be made both in the water supply delivery systems and in on-farm systems. Possible project areas are as follows:

- a) Water supply system
- (i) Infrastructure refurbishment, the replacement of ageing assets, is one of the major challenges facing irrigation system managers if irrigation is to be sustainable into the future. Innovative (and cheaper) technologies are required for replacement/remodelling of both earthen and concrete-lined channels. *Formulation of a research project could be through a workshop which brought together a wide range of people, from soil mechanics academics, through design and construction engineers to contractors.*

- Such a workshop, properly focused, could identify lines of research which could be pursued.*
- (ii) Automation of water delivery systems will save money and increase water use efficiency. Representatives of the major wholesale water agencies could develop a research project which would increase knowledge of suitable systems and adapt for Australian use. *Suggest a working group be established.*
- o) Integrated water management systems need to be developed in the area of integrated crop management systems and the interface between the water delivery and on-farm automatic systems. Some possible projects follow:
- (i) Loxton Research centre has developed an excellent Integrated Management System for the horticultural industry which is now commercially viable. Such systems need to be developed in conjunction with appropriate Research and Development Corporations (eg Dairy) for other irrigated agricultural enterprises. *The Institute for Sustainable Agriculture at Tatura could develop such a project in conjunction with the Dairy Research and Development Corporation.*
  - (ii) On-farm systems and off-farm water delivery systems are becoming automated. So far, little attention has been paid to integrating those systems to ensure maximum water use efficiency. *This project could be suitable for partnership work with, say the Dairy Research and Development Corporation and various horticulture groups.*
- c) Environmental allocations — environmental flows. While primary research in these areas will continue to be carried out through other programs, it is important that the irrigation industry contribute to the identification of environmental flows and consequent allocations. The industry needs to ensure both the protection of the resource and also optimise flows for irrigation through partnership projects.  
*Work is being undertaken on this topic, particularly at the Centre for Instream and Catchment Research at Griffith University but the CRC on Catchment Hydrology and the new CRC for Freshwater Ecology could also be involved. A working group comprising irrigation industry people and researchers could identify a project if there is not one already on the drawing board.*

#### **4.3 DRAINAGE, POLLUTION AND SALINITY**

There is a need to develop drainage systems which minimise discharge of pollutants to the environment. These could include re-use of drainage water, alternative disposal onto trees or crops and the use of artificial wetlands and vegetated drains as filters. *Suitable projects in this area could include:*

- a) Use of artificial wetlands to remove nutrients and pollutants from drainage water
- b) Development of salt tolerant trees and crops which could use drainage water
- c) Develop robust and inexpensive methods and instruments to monitor water quality on-farm as a part of an on-farm water management regime
- d) Use of effluent from other industries (agricultural and processing) as a source of

irrigation water — to reduce the environmental hazard of the other industry and reduce 'new' water consumption by irrigators

- e) Development of nutrient harvesting processes.

*These projects could be circulated for general expressions of interest to a wide range of research agencies.*

#### **4.4 TECHNOLOGY ADOPTION AND EDUCATION**

It is generally agreed that much of the research needed to underpin a more profitable irrigation industry which is ecologically sustainable has already been carried out. The "Water for Profit" programs of the Irrigation Association of Australia have brought together much of this information and identified the potential increase in yields per megalitre for a wide range of industries. The same programs have identified that, except for the top farmers, little of the new technology has been adopted through industries. Significant improvements could be made if we could identify the barriers, both generic and local, to technology uptake.

One of the key issues is identifying the target group for improved technology transfer. Much debate has taken place over the years and it is generally agreed that the top group of farmers will find out the information through simple techniques like publication in appropriate journals and presentation at seminars.

The target group is possibly the average to below average performer who has some scope to improve performance. This will yield a return to the State and nation of funds expended.

Performance can be measured in many ways — \$/ML, \$/ha, water use efficiency, high drainage flows. Choice of target group will determine which tools will be most useful for technology transfer. The law of diminishing returns applies.

*A well-conceived project is required to identify the barriers to technology uptake, identify target groups and determine suitable tools/techniques. The Management Committee could formulate such a project and seek expressions of interest from a wide range of research bodies which have attempted work in this area.*

*The committee could build on the findings of the recent survey of irrigators carried out by the Australian Irrigation Technology Centre which identified current sources of advice to irrigators.*

In respect of education, agriculture and agricultural engineering tertiary courses need a stronger focus on irrigation and natural resource management. Course material needs to be developed and universities need to update their expertise in irrigation. For information, *the IAA is developing a comprehensive program for irrigation education and this could be supported.*

*It is also recommended that one or more research scholarships be commissioned in the irrigation research program.*

## 5. Irrigation R&D Expertise

The following are some of the organisations with a demonstrated expertise in some aspect of irrigation research — the list is not comprehensive.

<b>ORGANISATION</b>	<b>CONTACT</b>
CSIRO Division of Water Resources, Griffith	Dr Wayne Meyer
CRC for Catchment Hydrology	Dr Emmett O'Loughlin
Centre for Environmental Applied Hydrology	Prof Tom McMahon
UNE Centre for Water Policy Research	Prof Warren Musgrave
Loxton Research Centre	Gerard Davies
Tatura Research Centre	Dr Colin Piggitt
Charles Sturt University (Riverina)	Prof Jim Pratley
University of Western Sydney (Hawkesbury)	Prof Don Lundie Jenkins
Dept of Resource Engineering, University of New England	Prof John Burton
Australian Irrigation Technology Centre	Jeremy Cape
CRC for Freshwater Ecology	Prof Peter Cullen
Centre for Instream & Catchment Research	Prof Angela Arthington
Dept of Agricultural Economics, Latrobe University	Prof A Chisholm
NSW Agriculture	Eddie Parr
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