



Australian Government

Australian Centre for International Agricultural Research

NOVEMBER 2009 – FEBRUARY 2010
www.aciar.gov.au

partners

IN RESEARCH FOR DEVELOPMENT

**PREDICTING SEASONAL
WATER AVAILABILITY**

**SAFE PASSAGE
FOR RIVER FISH**

A young boy with dark skin and hair is smiling as he washes his hands at a public water tap. The tap is brass and has a wooden handle. Water is flowing from the tap into his hands. He is wearing a blue t-shirt. The background is a blurred outdoor setting.

Water watch



ACIAR

www.aciar.gov.au

partners
IN RESEARCH FOR DEVELOPMENT

Water management and food security

Food security has dominated debate about development assistance ever since the food crisis of 2008. That crisis reminded the world that progress to eradicate hunger and extreme poverty can be easily undone.

A number of factors—drought, low reserves of food, high energy prices and changing emphases on crops sown for biofuels rather than food—converged to create the crisis. In the debate and responses that followed much was achieved to avert the crisis deepening.

Responses from the global community included emergency measures and longer-term initiatives to boost food stocks and refocus on the importance of increasing agricultural research and development (R&D) after a prolonged period of expenditure reduction. Much is still to be done to lift more than a billion people out of poverty.

Of all the factors that created the crisis one is likely to present the greatest challenges in the future—water management.

About 70% of the world's extracted freshwater resources are used to grow food. Demand for this resource is growing. Pressures from industry, urbanisation and environmental management are forcing farmers to compete for water. Changing climate conditions and prolonged periods of dry or drought are reducing water availability. Population growth over the next 40 years, with another two billion mouths to feed, will only amplify the pressures in this complex mix.

By 2025 global water use is expected to double. Demand for water is not isolated to regions or countries either. Where water courses and basins cross national boundaries—such as the Mekong River, which flows through half a dozen countries—water management becomes crucial.

Saving water and better managing its use have never been more important for agriculture. Diminishing agricultural R&D expenditure over the past two decades shows how easily food production can be taken for granted. As competition for water increases agriculture will face more pressure to further cut water use.

This presents a challenge for farmers and scientists, who will be expected to continue to produce more food, even as competition

for water intensifies. Agricultural R&D is already responding to this challenge, learning how to better manage crops in dryland conditions, and how to manage and preserve water resources.

Australia has significant scientific expertise in managing drought and water shortages. ACIAR is sharing this expertise with a number of partner countries where water management is needed to combat dry or drought conditions and to ensure that available resources are not depleted. The flow-on benefits from ACIAR-funded research have saved an estimated 1,000 billion litres of water each year, with the potential to save another 2,000 billion litres a year in Australia.

Conflicts over water distribution in India are not new. Water allocations from the Krishna River, which flows through three states, have previously been determined by a disputes tribunal. The reconvening of a tribunal for water management has been supported by an ACIAR-funded project that has helped demonstrate the need for a holistic approach to managing the river system.

Water and irrigation management in China has also been advanced through ACIAR research. Two projects, one on irrigation management and the other on policy approaches to increasing the value of water, are now linking with AusAID projects on water management. These are helping farmers understand the value of water, which is supplied freely in many areas, and manage irrigation to their crops in a more timely manner.

Changes to traditional irrigation-management approaches in southern Vietnam are also being made through ACIAR-funded research. Poor farmers in the area had linked irrigation needs to rules and dates, such as the Tet holiday, that were experience-based. Research has shown that using less water, with applications guided by simple on-farm management devices, provides improved yields. In China too, changes in fertiliser and water management resulting from ACIAR-funded research have resulted in less water being used, reduced greenhouse gases and increased yields.

These and other projects covered in this edition of *Partners* demonstrate that water management need not result in reduced yields, and that saving water is a vital component of long-term food security.

Partners in Research for Development is the flagship publication of the Australian Centre for International Agricultural Research (ACIAR). *Partners* presents articles that summarise results from ACIAR-sponsored research projects, and puts ACIAR research initiatives into perspective.

Technical inquiries will be passed on to the appropriate researchers for reply. Reprinting of articles, either whole or in part, is welcomed provided that the source is acknowledged.

This publication is freely available from ACIAR's website at www.aciar.gov.au. It is also freely available on request from ACIAR.

The use of a trade name does not constitute any endorsement of, or discrimination against, any product by ACIAR.

ISSN 1031-1009

© Commonwealth of Australia 2010

This work is copyright. Apart from any use as permitted under the *Copyright Act 1968*, no part may be reproduced by any process without prior written permission from the Commonwealth. Requests and inquiries concerning reproduction and rights should be addressed to:

Commonwealth Copyright Administration
Attorney-General's Department
Robert Garran Offices, National Circuit, Barton ACT 2600
or posted at <http://www.ag.gov.au/cca>

Published by the Australian Centre for International Agricultural Research (ACIAR)
GPO Box 1571, Canberra ACT 2601, Australia

For further information contact:
ACIAR Communications and Secretariat Unit
+ 61 2 6217 0500

Letters from readers are welcome, and should be addressed to:

The Editor
Partners in Research for Development
ACIAR
GPO Box 1571
Canberra ACT 2601
Australia

Email: comms@aciarc.gov.au

Photos: All photos ACIAR unless credited

coretext

Managing Editor: Brad Collis, Coretext Pty Ltd
Associate Editor: Dr Gio Braidotti, Coretext Pty Ltd
Design and Production:
Coretext Pty Ltd, +61 3 9670 1168, www.coretext.com.au



Mixed Sources

Product group from well-managed forests and other controlled sources
www.fsc.org Cert no. SCS-COC-006660
© 1996 Forest Stewardship Council

Features

Thirsty farms challenge India's food bowl 4

ACIAR is helping scientists and farmers manage water supplies that are stretched to capacity in India's food bowl, the Krishna River Basin

Models of prediction 7

Australian climate experts have developed models to predict seasonal water availability in Indonesia, helping farmers make more productive crop choices



Equitable flows 8

Increasing urban and industrial demand for water in China is placing pressure on agriculture to use water more efficiently

Less is more 10

The increased use of fertiliser has helped feed the world, but one ACIAR project is helping farmers on the North China Plain realise the impact of excess nitrogen on their finances, global warming and, especially, water

Water depth the root of the problem 12

Indo-Australian collaboration is allowing plant researchers to attempt something that has defied breeders for years—adapting the root system of wheat to better perform in drought



New rules for irrigation 15

By evaluating farmers' water scarcity in the context of the whole landscape, an ACIAR team is helping to develop new approaches to problems of sandy soils and low water availability in Vietnam's coastal farming regions

Testing the waters 18

Despite significant government infrastructure investment, efforts to encourage Indonesian smallholders to grow profitable vegetable crops have not been successful due to a series of contradictions that drive farmers' decision-making

Well-grounded water management 20

Smallholder farmers in the Philippines are beginning to benefit from modern amenities but, as with many developments, this new opportunity also brings a challenge: to ensure sustainable management of water resources

Fishways break down the barriers 22

Fish in the Mekong River provide food security for millions of people. However, thousands of weirs on the river's tributaries and flood plains are preventing fish from reaching vital breeding grounds. Fish passageways may hold part of the answer to the problem

Scientists rally to the challenge of a drying planet 24

The world's leading drought specialists gathered in Shanghai recently to advance global research into more water-efficient and drought-tolerant crops



ACIAR roundup

New ACIAR program structures 26

Deputy CEO moves to greener pastures 26

Crawford Fund Conference 2009 26

Agriculture institute marks 10-year anniversary 28

Helping to develop evaluation champions 29

ACIAR what's new

New publications 29

New projects 31