

Profiting from the climate prophets

Making seasonal climate forecasts available to farmers in Indonesia and the Philippines is contributing to better water-resource management

BY JANET LAWRENCE

Talk of climate change seems to focus on the headline grabbers—the high sea levels in several decades' time, or temperature rises between now and 2050. Far less emphasis is given to the season-to-season variations that are the reality of farming and can mean the difference between famine and plenty.

Many Australian and Asia-Pacific farmers grow their crops and raise their livestock

in a climate of uncertainty, marked in particular by large variations in rainfall. Over the past 20 years scientists have gained a clearer understanding of the mechanism driving these seasonal swings.

It is an ocean-atmosphere interaction in the tropics that gives rise to the El Niño-Southern Oscillation (ENSO), a seesaw of climatic conditions near the equator in the Pacific Ocean. It leads to the El Niño effect that causes the Pacific air pressure patterns to periodically reverse. During this phase,

a high-pressure system predominates over Australia and a low-pressure system occurs in the eastern Pacific. The consequence is drought in Australia, Indonesia and other South-East Asian countries.

Scientists studying the El Niño phenomenon, from actual and historical perspectives, now have models on which to base predictions of changing weather and rainfall patterns associated with ENSO.

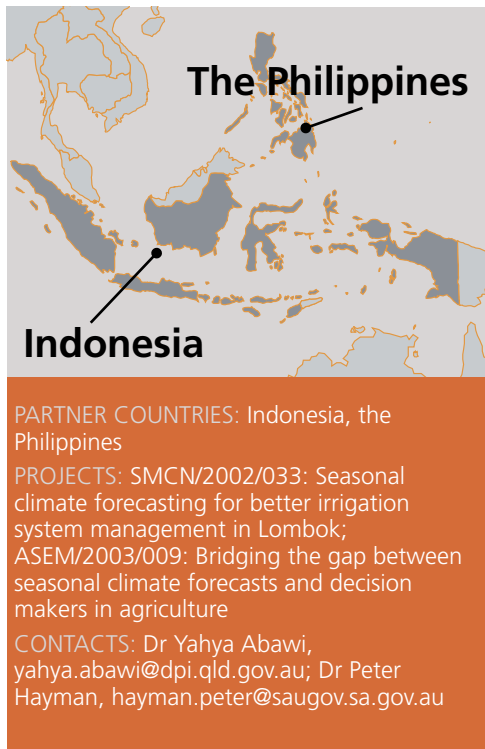
With global warming, the concern is that El Niño events could be more frequent and more intense. Thus the study of these seasonal fluctuations is important in the overall context of learning more about climate trends and developing practical tools for farmers.

A CIAR has been supporting research on the effects of ENSO on both climate and agricultural productivity. A project in the late 1990s involving Australia, Indonesia, Zimbabwe and India adapted the RAINMAN software package (designed to help Australian farmers construct their individual seasonal forecasts) to produce an international version. This made the tools for seasonal forecasting available to help agriculture in developing countries. The challenge was to demonstrate to farmers the model's reliability.

An irrigation channel in Lombok, one of many included in a climate model of water availability designed to help farmers make cropping decisions.

PHOTOS: BRONYA ALEXANDER, SARDI





Dr Yahya Abawi, from the Queensland Climate Change Centre of Excellence in Toowoomba, is the Australian project leader of the ACIAR-funded study on how seasonal climate forecasting can lead to better irrigation-system management in Lombok, Indonesia.

Dr Abawi says that social, cultural and policy issues often need to be addressed before the science of seasonal climate forecasting is acceptable to farmers and water managers. Educational levels may also influence their ability to adopt such innovations.

One of the issues that researchers hope the RAINMAN model will help address is the ability to predict stream flows during the irrigation season. This is important for effective water-allocation decisions, especially in regions where there is virtually no water storage.

Lombok has three distinct geographical zones. The western zone gets the most water, but has little agricultural land. The central zone, with moderate rainfall, has the most agricultural land, while the southern and eastern area is dry. Water for the drier zones comes from irrigation channels out of the river in the west, with seasonal and inter-annual rainfall influenced by ENSO.

In normal years this system is sufficient, but in El Niño years there is virtually no flow in these channels.

To help provide the region with seasonal forecasts, Dr Abawi and his Australian team have worked with Indonesian project leader Professor Mansur Ma'shum, from the University of Mataram in Lombok, and his Indonesian team to develop models of water availability throughout the irrigation system, taking into account different climate, water, land and institutional constraints.

Dr Abawi says the research has provided the tools on which to base optimal cropping decisions, but other considerations also influence decisions, such as rice growing being an enduring tradition. There are social as well as commercial factors underlying rice production.

The Indonesian team members have introduced the project outputs to farmer groups, field officers and government agencies in parts of Lombok. They are well aware that farmers are reluctant to change cropping patterns solely on the basis of climate forecast information, since having to rely on crops grown on quarter-hectare farms (the average size in Lombok) makes them very vulnerable to any crop failure.

Nevertheless, they concur with Dr Abawi,

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– Dr Yahya Abawi

who believes it is worth persevering to change this hesitation. “Significant economic gains can be realised through water-allocation and cropping decisions at a scale that suits the characteristics of these smaller farms,” he says.

A similar set of issues is confronting the ACIAR team undertaking a Philippines-based project looking at the economic value of seasonal climate forecasts (SCFs) and the gap that exists between such information and decision-makers in agriculture.

The team is working with the Philippine meteorological service (PAGASA) to develop and implement strategies to better match forecasts with decision-makers' needs. The project involves a series of farm-level and policy-level case studies to determine how people can integrate forecasts into risk-management strategies. ↪



ways to better link climate science with the community.

A typical case study in the Philippines involved corn farmers in the Visayas region. Team members compiled a brief description of dominant cropping patterns and corn production practices in the study area, then reviewed and presented a valuation framework for estimating the economic benefits of SCF information under various assumptions of risks and uncertainty.

Their task was then to quantify the potential economic value of SCFs to corn farmers in Leyte. These data, along with the findings of another study of corn farmers in Isabela, helped them draw up policy implications on the usefulness of SCFs to corn farmers throughout the Philippines.

Surveys showed that farmers held a high degree of concern about climate risk and were well aware of El Niño, but they only made moderate use of the information in decision-making. As part of the project, the team refined an Excel-based game that allows participants to work out the best decisions for their situations, based on forecasts that are more than guesswork but fall short of perfect information.

PIDS is the lead agency in another project initiative, in which researchers developed a national policy paper examining how SCFs can affect rice policy decisions made by the National Food Authority, particularly with regard to rice importation. The paper argues that imports have played an important role in the rice supply–demand situation of the country since 1990. The study found that inaccurate forecasts of the volume, as well as timing, of rice imports, especially during El Niño years, resulted in substantial economic costs. These costs could be variously manifested as rice shortages, higher rice prices, or excess rice leading to higher storage costs.

Thus policy decisions—such as how much rice to import into the Philippines, what variety of corn, and how much fertiliser to use in certain regions—are intrinsically linked with issues of seasonal forecasting and climatic risk.

Dr Hayman has found that engaging decision-makers in these diverse contexts is helping them to realise the challenges of using climate information while teaching them how to rate the value of seasonal climate forecasts for different situations. ■

Team members speak with farmers in the Philippines, about better ways to match climate forecasts to the needs of agricultural decision-makers.

The team found International RAINMAN a useful tool to convey when and where to expect a strong ENSO signal, and when to use climatology as an appropriate guide to the approaching season.

Project leaders Dr Peter Hayman, from the South Australian Research and Development Institute (SARDI), and Dr Celia Reyes, of Leyte State University, report that the ongoing drought in Australia and typhoons in the Philippines, combined with a high level of media coverage regarding climate change, has ensured strong interest in the results of the project. PAGASA has benefited from the collaboration, lifting its capacity to deliver SCFs for the regions in the case studies. PAGASA in turn has partnered with the Philippine Institute for Development Studies (PIDS) and Visayas State University. Together the three institutions are finding



Joint project leader Peter Hayman (right) in a discussion session with project members from PAGASA, PIDS and LSU in Quezon City.

PHOTOS: BRONVA ALEXANDER, SARDI