

Coping with climate change

Agriculture depends on the sustainable use of natural resources and, for this reason, will be more directly and significantly affected by climate change than other sectors of the economy. Agriculture is also a significant contributor to climate change. Developing countries are more likely to be affected by climate change because they rely more on agriculture for employment and contribution to their economies.

And the poorest farmers—who are often located on the more marginal production areas—could be expected to bear the brunt of climate-change impacts

first. They are also generally the first to feel the effects of seasonal climate variability.

Agricultural research plays a central role in helping farmers, farmer communities and policymakers develop strategies to adapt to, or lessen the effects of, climate change. In the first instance, ACIAR funds several projects that address *seasonal* climate variability. Some of the tools that are developed to make decisions on seasonal variability can then be applied to longer-term shifts in climate associated with global warming.

Improving the reliability of seasonal forecasts is a key tool for reducing farmers' exposure to risk. One project in Lombok (eastern Indonesia) is applying the knowledge of seasonal climate forecasting to the management of irrigation systems, while another in the Philippines is looking at potential economic benefits of seasonal forecasts and how they can be used in setting policies (see 'Profiting from the climate prophets').

Reducing carbon emissions and other greenhouse gases that contribute to climate change is another focus for ACIAR. Examples covered in this issue of *Partners* include assessments of carbon sequestration in Indonesia, where economists and scientists are working out ways to pay farmers for planting forests, or for leaving forests standing; the 'Happy Seeder' project in the Punjab state of

India, which addresses the environmental and public health benefits derived from sowing seed directly into the soil without the need for burning off stubble from the previous crop; and management of nitrogenous fertilisers in the North China Plain, where scientists have shown that, by reducing the amount of fertiliser used on rice crops, not only is there reduced wastage and improved profits for farmers, but also less emissions of nitrous oxide—one of the most potent greenhouse gases.

Most of ACIAR's climate-change work is concerned with adaptation—helping build the capacity of farmers to respond to climate change, through the development of more sustainable, resilient agricultural systems. This can be achieved by identifying and developing new crop varieties—for example

breeding for better water-use efficiency, tolerance to drought and water-logging, and resistance to pests and disease that may become more prevalent in a changed climate. An important aspect of this work is the collection of data and material for international gene banks.

Another way that more resilient agricultural systems can be achieved in the face of shifting climates is by changing farming practices. In a China grasslands project, for example, reducing livestock numbers was shown to increase yields and profits for smallholder farmers, at the same time reducing soil erosion and methane production.

Each of these climate-change projects is driven by the need to improve smallholder productivity while at the same time addressing climate change and environmental protection. If new practices and products can be shown to be cost-effective, and to improve agricultural profitability and sustainability, there is a good chance they will be adopted by farmers. And any benefits to the environment, in terms of reduced greenhouse gas emissions and land degradation, will follow.

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