

The tech fix that won't secure food supplies

By [Anita Makri](#)

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Eight years ago, some 2,000 farming households in the Philippines signed up to a project designed to help them better manage how they grow rice and boost their incomes. The idea was to build a stronger system of irrigation, with a mix of other offerings such as marketing support and field schools for farmers.



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After a five-year run, the UN agency behind the project – the International Fund for Agricultural Development (IFAD) – did an impact evaluation that brought some good news. The project had worked. It led to higher rice yields, better market access, and a higher income for rice farmers in two of the three areas it had targeted.

However, things hadn't gone according to plan in the third area - a part of the country that had been hit by Typhoon Haiyan in 2013.

"We hadn't factored in this kind of high-risk event," says Paul Winters, IFAD's associate vice-president of the Strategy and Knowledge Department. "It wasn't that the tsunami destroyed the irrigation system, but it destroyed the collective management of it." People simply had to deal with other, more pressing demands on their lives after the typhoon.

Winters believes the case shows why it's not enough to think just in terms of introducing technology — that this type of risk needs to be factored into projects from the start.

He says that, because climate change means conditions will keep changing, food security becomes a moving target. And this means tested methods of managing resources in the face of climate change now have a short shelf-life. "It's hard to know for sure whether the actions we're taking will be appropriate for a new context. We need to keep experimenting."

Set up to succeed

Programmes that introduce technology should find fertile ground for this – the drive to experiment is often part of life in agriculture. "As a farmer I know that we are constantly looking for ways to improve our lot," says Onyaole Patience Koku, an entrepreneur and farm manager in Nigeria. "If [a new] technology is available and accessible, most farmers will use it."

Climate change now adds urgency to the need for farmers to constantly adapt. Journalist Lisa Palmer, part of the Bellagio Science for Development residency, witnessed this in 2016 while visiting the state of Punjab in northern India. She says a farmer eager to showcase his rice field explained how a process he had used for the first time meant his plants stayed healthy after a difficult season.

The problem was unpredictable rainfall: three months' worth of rain had fallen in the course of three days. Normally that would leave soils waterlogged and plants unable to grow. But after taking advice from the Borlaug Institute for South Asia (BISA), he held off from tilling or burning residue from the previous season's wheat harvest, retaining stems and roots in his fields. When the torrential rains came, this allowed water to drain through. "For him, that method was a form of risk reduction with the changing climate," says Palmer.

Countless initiatives have put forward methods to boost farmers' productivity and income – there's no shortage of proposed solutions. Over the past few decades, scientific and technological advances from crop breeding to fertilisers to a range of irrigation techniques have powered agricultural production in a bid to keep up with the food demands of a rising population.

But for some years now, that growth has faced natural resource limits: land and water scarcity, soil degradation, pollution from synthetic pesticides and fertilisers, and monocultures that deplete soils and crop diversity.

In the Punjab, for example, Palmer says that heavy subsidies for fertiliser and energy to power irrigation systems have led to over-fertilisation and groundwater withdrawal, leaving the area with polluted and dwindling water supplies.

Immediate risk

These count as serious risks. But so does the prospect of having a poor harvest. And minimising that immediate risk is part of technology's appeal: season after season, farmers need to make sure their crops will grow, and governments are eager

to have a steady supply of food.

The problem is that technologies which promise greater efficiency and boost production trade off short-term, 'band-aid' solutions against resilience over the longer-term, says Gyorgy Scrinis, a senior lecturer at the University of Melbourne and academic writing resident at Bellagio. But there are alternatives, such as agroecology, that do offer that resilience. "Technologies are never neutral – they really tend to support particular types of agricultural and technological systems," he says.

Another trade-off, according to Scrinis, is that technologies often come with strings attached. Farmers can get "locked in" to obligations and contracts, which mean losing control over how they work their land. This can happen with reliance on a narrow range of seeds, for example, or on methods such as precision farming where seeds, water, fertilisers and pesticides are all managed through computerised systems – giving farmers precise control over their farm, but surrendering control and data to companies that provide these systems.

"Typically, farmers become indebted to agribusinesses when they take inputs on credit but their harvest gets wiped out by disease, climate shocks and other insecurities," explains Anastasia Mbatia, Agriculture Technical Manager at the NGO Farm Africa.

Scrinis says there is some change in the food system, but it's slow. "We're heading in both directions – still going down that one path of producing big mega crops, but also diversification is happening on the farm."

Zulfiqar Bhutta, a paediatrician based in Canada and Pakistan, sees similar signs of a gradual move towards so-called 'nutrition-sensitive agriculture' that aims to better align agricultural production with people's nutritional needs.

Staying resilient

How can farmers keep experimenting to deal with the uncertainty of climate change, without resorting to technology that undermines autonomy?

There's no easy answer. And farm size matters – a smallholder growing quinoa in Bolivia is very different from one growing the crop for export. But Scrinis believes that, over time, smallholders will play an important role in creating more resilient farming systems. "[They] still produce by some estimates over half of the food and the nutrition that we actually consume."

Agricultural systems that integrate livestock and multi-crop farming can help build resilience, according to Rikin Gandhi, executive director of Digital Green. Diversity is important – even among farms of a certain size, environmental conditions

and agricultural practices will vary. "No institution is going to be able to figure out the perfect 'package of practices' for an individual farmer," he said during a SciDev.Net debate on food security earlier this week.

Gandhi believes that to counter the potential downsides of new tech, development organisations need to "really start with the farmers themselves, to empower them with the know-how and data to make their informed own choices" so that technology is an enabler, not something that locks them in.

"Agricultural advice – for example based on soil, weather, and market data – can enable farmers to make site-specific decisions." He gives the example of Zero Budget Natural Farming, an initiative in Andhra Pradesh, India, which can target an individual farmer or even an individual plot.

"In pest management, farmers are very innovative," says Roger Day, a programme executive at the Centre for Agriculture and Bioscience International (CABI) in Kenya. Scientists can play a role to validate, but can't test everything. "So farmers should be encouraged to innovate, and through methods such as field schools, empowered to make their own observations and assessments."

Participants at Bellagio stress the role of infrastructure, a country's organisational capacity, and networks for sharing information – including learning from farmers themselves, rather than always assuming they need help.

With growing mobile connectivity, farmers can share information and resources through SMS services like WeFarm and videos produced by farmers themselves through Digital Green. "We've been able to join over 60,000 farmers to our network each month and we've had our first month where farmers have asked and answered more than one million questions," says Radha Ahlstrom-Vij, global head of brand at WeFarm.

Genuine exchange needs to also include others in the agricultural ecosystem, according to Gandhi – agrodealers, truckers, traders, extension workers. "Ultimately, farmers are one of the largest group of small business people," he says. "So it's crucial that technology be low-cost and adaptable for the diverse, local conditions in which they operate."

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