When I Think about Poverty
by Robert S. Zeigler

When I think about poverty, I think back to the 1990s when I was traveling in Bangladesh. Driving through the countryside after the rice harvest, I saw some piles of dirt out in a field. I stopped to investigate. The accompanying photo below shows what I found. A farmer squats in front of a hole he has just dug out. He’s holding rice panicles.

What’s going on here? The hole was a rat’s nest. After the harvest, the landless poor of Bangladesh go out into the fields to find these nests. They excavate them to take back the rice that the rats have stolen. To me, that’s poverty.

Poverty is more than not having money in your pocket—it’s not having food to feed your children, not having enough to provide them a decent education or health care. When we talk about dealing with food shortages, we’re also talking about poverty. That’s something we need to be more cognizant of as we discuss food security.

The world continues to have huge concentrations of poverty, and most of these concentrations are in areas where rice is grown. If we want to overcome the problems of hunger—and poverty—then rice must be part of the solution.

Global demand for rice will continue to grow. Every past prediction that demand for rice will taper off has been proven incorrect. Current population trends suggest an additional billion people every 12 to 15 years. In the rice-consuming world, another billion people means 100 million tons of additional paddy needed to feed them. That’s an additional 65 million tons of milled rice every decade and a half.

Where will this additional rice come from? Ideally, it will come from existing crop land, primarily in Asia. But land is moving out of agriculture, especially in Asia, where rice fields are being steadily converted to other uses. Labor is also moving out of agriculture. When I visit a rice-growing region, I always ask the farmers: What do you want your kids to be when they grow up? Rice farmers never, ever want their own children to be rice farmers!

Innovations in production practices, driven by research, will help balance these forces and help us stay where we are. However, “where we are” is not good enough. The challenges of climate change are also going to affect agriculture, especially rice cultivation. We need rice varieties that can tolerate...
result of soil loss and degradation. Exposed soil loses carbon. Low-carbon soil retains less water, so rainfall evaporates or flows away. Without moisture, the ground becomes a hot plate, and microorganisms die. This dynamic sets up the scenario for flooding (when rains arrive) or drought (when it doesn’t)—the type of situation that’s led to famine in, say, the Horn of Africa, widespread food insecurity, and global financial losses in the tens of billions of dollars annually. Functioning land has soil carbon, plant cover, and the capacity to hold moisture. In the event of heavy rain, water is absorbed by the soil and filters into aquifers. With more moisture in the “bank,” such land can support plant and microbial life when rain is sparse.

An appreciation of land function sheds new light on strategies to bolster food security. For example, the best genetics in the world won’t increase yields if we attempt to grow crops on depleted soil. While heavy nitrogen fertilizer can temporarily mask soil depletion, it ultimately alters the soil’s microbial balance and pH in a way that reduces fertility, leaving farmers on a costly and counterproductive agro-chemical treadmill.

The stresses to food security are daunting, and the prospect of changing weather patterns adds to the collective alarm. However, there is good news: a shift toward considering land function introduces proven restorative practices that boost resilience to weather extremes while minimizing the cost of inputs. It’s all a matter of starting with the soil.

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higher temperatures and withstand floods. We also need rice varieties that can tolerate drought and saline soils, particularly in coastal areas. And we need production practices that are more efficient, that demand less water and other inputs, and that produce consistently good yields.

We can now address these challenges in ways that we never could before. Ten million years ago, rice species started to evolve. They diversified in some very difficult environments, some droughty, some stony, and some shady. That genetic diversity, in combination with advances in molecular biology and computational power, allows us to tap into incredible wealth from diverse environments. We now have the ability to cross wild relatives with domesticated rice to bring in traits separated by millions of years of natural selection and evolution.

To help achieve this, the International Rice Research Institute (IRRI) maintains the world’s largest collection of rice germplasm—more than 120,000 rice accessions and wild relatives. The IRRI genebank also contains wild relatives of rice, vital additional resources to help us meet tomorrow’s challenges.

We also need to understand how a rice crop behaves, and new technology will help with that. Satellite imagery and cloud-penetrating radar will show us where rice is planted, when it is planted, and how much area is planted. Combining this information with plant growth models, we can improve food security in the rice-consuming world. Add this to the decades of experiments on crop nutrient management that we’ve conducted across Asia, and we have the tools that will enable farmers to make real-time decisions about managing their crop.

All that being said, the ultimate question is: how do new rice varieties actually perform in farmers’ fields? On 31 July 2008 at 1:17 p.m., Mr. Asha Ram Pal stood in his rice field after two successive floods and considered his options. His neighbors laughed and told him to plow it up because “you’re not going to get any crop out of that field.” He didn’t plow it up, and in October of that year, he had a good harvest.

I asked Mr. Pal how the rice tasted. He said he didn’t know because he sold the entire crop as seed to his neighbors—the same neighbors who told him to plow up his field in July.

The moral here is “always listen when people laugh at you, and then do the opposite of what they say.” Seriously, Mr. Pal’s flood-tolerant rice is already in the hands of more than 5 million farmers in Asia. I would like to suggest that a second Green Revolution in rice started at 1:17 p.m. on 31 July 2008 when Mr. Pal decided not to plow up his field.

Food security in 2050 requires that two Green Revolutions succeed: the first revolution, started in the 1960s, to continually increase yield to meet ever-rising demand, and a second revolution to help the poorest farmers who have no choice but to plant in the most unfavorable environments.

In addition to our research efforts, we must help people prepare for catastrophic times. Even under ideal conditions, rice farmers have a tough job. And under no circumstance should farmers have to steal back their harvest from rats.

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