As a journalist, I’ve devoted the last couple of years to looking at soil as a hub for our many global challenges—and for solutions. So when it comes to the growing of food, I take a soils’-eye view. Ultimately, food can only be as good as the soil on which it was grown. Moreover, the biological processes that drive crop production depend on the workings of numerous cycles—the carbon, energy, water, and nutrient cycles—each of which moves through the soil. If, based on my research and on-the-ground reporting, I were to offer up a prescription as to how we, collectively, can keep our population fed, it would be this simple: our practices, actions, and policies should be assessed according to whether or not they are good for the soil.

I see this as particularly relevant at a time of impending climate instability. For while it’s not often discussed as such, soil health is a lever for climate change adaptation and mitigation. Soil—that fine, living layer that cloaks the earth—is where food, farming, and climate meet. To a large degree, our capacity to feed the world in the coming decades depends on how we treat the soil. If we approach food production from the standpoint of extracting from the soil, we risk depleting this resource. If, however, we seek agricultural practices that regenerate the soil, we not only promote food security but also ameliorate other environmental problems looming over us. Soil, you see, is the connector.

Let’s zero in on some current challenges to food security. Right now, in food-producing areas around the world, the best-laid plans are haunted by the specter of weather abnormalities, notably floods and droughts. But once we bring land function—the ability of land to sustain plant and animal life—into the picture, we open up new possibilities for building security into the food supply. An emphasis on floods and droughts—whether there’s not enough rain or too much all at once—leaves the impression that we’re at the mercy of the elements. By contrast, a focus on land function creates a sense of agency. Specifically, it draws our attention to the many ways we can enhance soil’s ability to retain water, organic matter, and microbial life, thereby offering resilience in the face of flooding and dry skies.

Although largely invisible to the general U.S. public, land degradation due to human impact is a huge problem across the globe. According to the United Nations Convention to Combat Desertification, each year upwards of 12 million ha (30 million ac) of productive land is lost to desertification. This means an area the size of South Africa is slipping away every decade. Some 1.5 billion people, primarily in dryland regions, rely on land categorized as degraded for their food and livelihood. What’s important to keep in mind about desertification, and, more generally, land degradation, is that it’s not something that simply “happens.” Rather, it’s caused by such soil-harming actions as overcultivation, deforestation, poor irrigation design, poor livestock management, and the use of technology ill-suited to the landscape.

Many of the problems we attribute to climate change are, in fact, the direct

Land management approaches that integrate animals and crops are often used to build soil health. Photo by Tony Eprila, Cold Moon Farm, Jamaica, VT.
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.

J.D. Schwartz, journalist and author of Cows Save the Planet and Other Improbable Ways of Restoring Soil to Heal the Earth, Bennington, VT; judithd@sover.net.

When I Think about Poverty continued from page 6

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, allow 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.

R.S. Zeigler, Director General, International Rice Research Institute, Los Baños, The Philippines, rzeigler@irri.org.