



STATE OF THE WORLD 2011 Innovations that Nourish the Planet



State of the World Brief Series

Chapter 8. Coping with Climate Change and Building Resilience

Key Messages

- Agriculture is the human endeavor most likely to be affected by climate change, but it is also a major contributor to global climate change through fossil fuel use and deforestation.
- Innovations exist that could mitigate agriculture's contribution to climate change while helping farmers adapt to the impacts of this change.
- Given the uncertainty of future climate conditions, there is a strong need to evaluate all such innovations and invest in those that are most promising.

The Problem

Global climate change threatens to affect agriculture dramatically as climates destabilize and as growing conditions become less predictable. New research suggests that erratic weather conditions will lower crop yields and make managing livestock more challenging. In the developing world, many farmers already battle adverse growing conditions and degraded soils and lack the resources to develop more resilient systems.

Agriculture and the global food system are major contributors to climate change. Livestock production accounts for an estimated 18 percent of global emissions, mainly through the release of methane, a greenhouse gas more potent than carbon dioxide. Agriculture is also responsible for the clearing of forests, which accounts for some 17 percent of human-caused CO₂ emissions and diminishes the planet's ability to sequester carbon. From production to processing to transportation, agriculture depends heavily on fossil fuels and accounts for as much as one-third of total greenhouse gas emissions.

Innovations/Solutions

Addressing the dual challenge of making global agriculture more climate friendly as well as resilient to the impacts of climate change means creating



Picking organic eggplant in the Gambia. (Bernard Pollack)

systems that require fewer inputs, are capable of sequestering carbon, and conserve resources such as soil and water. Examples of innovations include:

Farmer-managed natural regeneration and agroforestry. In Africa's semi-arid Sahel region, climate change will likely increase water scarcity, expanding the desert south. The past response to water loss and soil erosion problems has always been to plant more trees. But only 10–20 percent of trees planted in the region survive past a few years, and there is little evidence that they are effectively conserving soil. Research suggests that "farmer-managed natural regeneration," whereby farmers nurture patches of naturally regenerated woody plants, is less likely to fail.

In Niger, such efforts have resulted in nearly 5 million hectares of newly wooded area. These woods effectively conserve water and prevent erosion, creating agroforestry systems that make farms more productive and drought resistant. In addition to sequestering carbon, some species provide fruit or animal fodder and fix nitrogen, enriching soil fertility.



Tree seedlings waiting to be planted. (Bernard Pollack)

Organic farming and agroecology. Unlike conventional agriculture, organic agriculture does not depend on petrochemical fertilizers and pesticides to achieve high yields. Instead, the focus is on maintaining soil quality and fertility through the use of agroecology techniques such as cover cropping and crop rotation. By using fewer petrochemicals, organic operations often have fewer greenhouse gas emissions than conventional operations. Organic soils also sequester carbon better year to year: according to one estimate, if 175 million hectares of U.S. cropland were made organic, nearly 1.6 billion tons of carbon dioxide, roughly a quarter of U.S. annual emissions, could be sequestered annually.

Critics argue that organic agriculture is incapable of producing the same yields as conventional approaches. Yet a growing body of evidence suggests that well-managed organic operations could match or even exceed conventional yields, particularly in the developing world. In studies, farmers in developing countries who transitioned to agroecological techniques generally saw dramatic increases in yields. According to the International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD), relying on conventional agriculture that requires chemical inputs and depletes resources is dangerous given the climate, energy, and water challenges we face. Because organic and agroecological systems use

resources more sustainably, they are more adaptable to a changing world.

Looking Ahead

Although we can be confident that global climate change is occurring, exactly how local climates will change is harder to predict. This makes it difficult to choose which adaptation strategies will be the most effective and successful. In the developing world, where money can be scarce, it is particularly important that resources be dedicated to identifying which approaches are most successful. With so much at stake, such investigations must be thorough and honest, applying proven research methods to compare techniques. Once the most effective strategies are identified, investment can then be quickly directed to scale those efforts up. Minor investments in research could help save significant amounts of money by ensuring that the ideas being promoted are pragmatic and sustainable.

Once effective projects have been identified, the next step is to maximize their benefit by scaling up efforts by involving more farmers and stakeholders and giving them the tools and encouragement to adapt and follow through with a new idea. Effective collaboration, communication, and on-the-ground support are essential. Tools for achieving this goal include: connecting farmers together to share ideas and experiences; highlighting and acting on existing successes; building local infrastructure and institutions to provide continued support; and spreading the word through various media sources.

Meanwhile, progressive agricultural policies can create incentives for farmers and stakeholders to transition to more sustainable, climate-friendly systems, especially in places where unsustainable practices are deeply entrenched. Initiatives such as the U.S. Department of Agriculture's Organic Certification Cost Share program, which covers up to 75 percent of the cost of organic certification, encourage farmers to undertake a new approach that they may otherwise resist. Mainstreaming and supporting policies that expand incentives for farmers to transition while also strengthening regulation of existing bad practices are important to creating conditions in which new, alternative ideas are viable and even attractive.