Agriculture and Climate Change: An Agenda for Negotiation in Copenhagen

Overview

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If fundamental climate change mitigation and adaptation goals are to be met, international climate negotiations must include agriculture. Agriculture and climate change are linked in important ways, and this brief focuses on three: (1) climate change will have large effects on agriculture, but precisely where and how much are uncertain, (2) agriculture can help mitigate climate change, and (3) poor farmers will need help adapting to climate change. As negotiations get underway in advance of the meeting of the 15th Conference of Parties of the UN Framework Convention on Climate Change in Copenhagen in December 2009, this brief suggests negotiating outcomes for both mitigation and adaptation funding that will support climate change goals while enhancing the well-being of people who manage and depend on agriculture, especially in the developing world.

Goal

Put agriculture on the agenda of the UN Framework Convention on Climate Change negotiations in Copenhagen

Climate change will affect agriculture, but it is uncertain where and how much

Climate change will have dramatic consequences for agriculture. Water sources will become more variable, droughts and floods will stress agricultural systems, some coastal food-producing areas will be inundated by the seas, and food production will fall in some places in the interior. Developing economies and the poorest of the poor likely will be hardest hit. Overall, however, substantial uncertainty remains about where the effects will be greatest.

Agricultural outcomes are determined by complex interactions among people, policies, and nature. Crops and animals are affected by changes in temperature and precipitation, but they are also influenced by human investments such as irrigation systems, transportation infrastructure, and animal shelters. Given the uncertainties about where climate change will take place and how farmers will respond, much is still unknown about the effects of climate change on agricultural production, consumption, and human well-being, making it difficult to move forward on policies to combat the effects of climate change.

Suggested negotiating outcome: Fund research on the interactions between climate change and agriculture

Research should be funded that improves understanding and predictions of the interactions between climate change and agriculture. Climate change assessment tools are needed that are more geographically precise, that are more useful for agricultural policy and program review and scenario assessment, that more explicitly incorporate the biophysical constraints that affect agricultural productivity, and that better integrate biophysical and socioeconomic scenarios.

Agriculture can help mitigate greenhouse gas emissions

Today, agriculture contributes about 14 percent of annual greenhouse gas (GHG) emissions, and land-use change, including forest loss, contributes another 19 percent. The relative contributions differ dramatically by region. The developing world accounts for about 50 percent of agricultural emissions and 80 percent of land-use change and forestry emissions.

The formal inclusion of REDD (Reducing Emissions from Deforestation and forest Degradation) in the current negotiations is a result of a new appreciation of the importance of this source of GHGs and initial findings of low-cost opportunities to reduce them. Significant challenges remain, however. What are the best ways to dissuade poor people from cutting down trees and converting other lands to unsustainable agricultural practices and to encourage them to adopt technologies and management strategies that mitigate carbon, methane, and nitrous oxide emissions? The tasks ahead include identifying and supporting the most appropriate approaches in farmers' fields and monitoring their implementation.

Suggested negotiating outcome: Fund cost-effective mitigation in agriculture and research on promising technologies and management systems

Agriculture has huge potential to cost-effectively mitigate GHGs through changes in agricultural technologies and management practices. Changing crop mixes to include more plants that are perennial or have deep root systems increases the amount of carbon stored in the soil. Cultivation systems that leave residues and reduce tillage, especially deep tillage, encourage the buildup of soil carbon. Shifting land use from annual crops to perennial crops, pasture, and agroforestry increases both above- and below-ground carbon stocks. Changes in crop genetics and the management of irrigation, fertilizer use, and soils can reduce both nitrous oxide and methane emissions. Changes in livestock species and improved feeding practices can also cut methane emissions. Mitigation funding programs arising from the negotiations should thus include agriculture.

Suggested negotiating outcome: Fund low-cost systems for monitoring agricultural mitigation

It is much easier to monitor 1,500 U.S. coal-fired power plants than several million smallholder farmers who rely on field, pasture, and forest for their livelihoods. Nonetheless, promising technologies exist for reducing the costs of tracking the performance of agricultural mitigation programs. For example, microsatellites can be used for frequent, high-resolution land cover imaging, inexpensive standardized methods are available to test soil carbon, and simple assessment methods can adequately quantify the effects of management technologies on methane and nitrous oxide emissions. These monitoring technologies and others require funding.

Suggested negotiating outcome: Allow innovative payment mechanisms and support for novel institutions for agricultural mitigation

Agricultural production differs qualitatively from other sources of GHGs in that the sources are individually small, geographically dispersed, and often served by inadequate physical and institutional infrastructure. Cost-effective payment mechanisms to encourage agricultural mitigation must reflect these differences. Beyond the traditional schemes developed under the Kyoto Protocol, the negotiating outcome should allow and encourage alternatives that take advan-

tage of these differences, exploiting activities beyond project-specific funding. Examples include land retirement contracts, one-time payments for physical infrastructure investments that have long-term mitigation effects, and payments for institutional innovations that encourage mitigating behavior in common property resources.

Cost-effective ways are needed to help poor farmers adapt to climate change

Even with the best efforts to mitigate climate change, it is inevitable that poor farmers will be affected. The goal is to find and fund the most cost-effective ways to help the poor adapt to the changes, a daunting task because of uncertainty about the magnitude of possible changes, their geographic distribution, and the long lead times needed to implement adaptation efforts.

Suggested negotiating outcome: Allow funding mechanisms that recognize the connection between pro-poor development policies for sustainable growth and sound climate change policies

A pro-growth, pro-poor development agenda that supports agricultural sustainability also contributes to climate change adaptation. Adaptation is easier when individuals have more resources at their command and operate in an economic environment with the flexibility to respond quickly to changes. If, as seems likely, the effects of climate change will fall disproportionately on poor farmers, a policy environment that enhances opportunities for smallholders will also be good for climate change adaptation. Such an environment would include more investment in agricultural research and extension, rural infrastructure, and access to markets for small farmers. Funding should support these kinds of policy changes.

Suggested negotiating outcome: Allow funding mechanisms that recognize and support synergies between adaptation and mitigation

Many changes to management systems that make them more resilient to climate change also increase carbon sequestration. Conservation tillage increases soil water retention in the face of drought while also sequestering carbon below ground. Small-scale irrigation facilities not only conserve water in the face of greater variability, but also increase crop productivity and soil carbon. Agroforestry systems increase above- and below-ground carbon storage while also increasing water storage below ground, even in the face of extreme climate events. Properly managed rangelands can cope better with drought and sequester significant amounts of carbon. Project- and program-based funding schemes that support adaptation should also be able to draw on mitigation resources.

Suggested negotiating outcome: Provide funds for agricultural science and technology

Even without climate change, greater investments in agricultural science and technology are needed to meet the demands of a world population expected to reach 9 billion by 2050. Many of these people will live in the developing world, have higher incomes, and desire a more diverse diet. Agriculture science- and technology-based solutions are essential to meet those demands.

Climate change places new and more challenging demands on agricultural productivity. It is urgent to pursue crop and livestock research, including biotechnology, to help overcome stresses related to climate change such as heat, drought, and novel pathogens. Crops and livestock are needed that respond reasonably well in a range of production environments rather than extremely well in a narrow set of climate conditions. Research is also needed on how dietary changes in food animals can reduce methane emissions.

One of the key lessons of the Green Revolution is that improved agricultural productivity, even if not targeted to the poorest of the poor, can be a powerful mechanism for alleviating poverty indirectly by creating jobs and lowering food prices. Productivity enhancements that increase farmers' resilience in the face of climate change pressures will likely have similar poverty-reducing effects.

Suggested negotiating outcome: Provide funds for infrastructure and institutional innovations

Improvements in water productivity are critical, and climate change, by making rainfall more variable and changing its spatial distribution, will exacerbate the need for better water harvesting, storage, and management. Equally important is supporting innovative institutional mechanisms that give agricultural water users incentives to conserve.

Investments in rural infrastructure, both physical (such as roads, market buildings, and storage facilities) and institutional (such as extension programs, credit and input markets, and reduced barriers to internal trade) are needed to enhance the resilience of agriculture in the face of the uncertainties of climate change.

Suggested negotiating outcome: Provide funds for data collection on the local context of agriculture

Agriculture is an intensely local activity. Crop and livestock productivity, market access, and the effects of climate all are extremely location specific. Yet global efforts to collect and disseminate data on the spatial nature of agriculture, especially over time, are limited. Countries have reduced funding for national statistical programs, and remote sensed systems are still inadequate to the task of monitoring global change. Understanding agriculture-climate interactions well enough to support adaptation and mitigation activities based on land use requires major improvements in data collection and provision.

Concluding Remarks

Agricultural activities around the world are responsible for almost 15 percent of annual greenhouse gas emissions, could be an important sink for emissions from other sectors, and are likely to be altered dramatically by climate change. Agriculture also provides a living for more than half of the world's poorest people. The ongoing negotiations to address climate change provide a unique opportunity to combine low-cost mitigation and essential adaptation outcomes with poverty reduction. ■

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