# Agriculture and Climate Change: An Agenda for Negotiation in Copenhagen

## The Important Role of Extension Systems

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Climate change will certainly affect agriculture, but agriculture can also be harnessed to mitigate greenhouse gas (GHG) emissions. A key element in supporting agriculture's role is information. The costs of adapting agriculture to climate change can be large and the methods not always well known. Mitigation efforts will require information, education, and technology transfer. Agricultural extension and advisory services, both public and private, thus have a major role to play in providing farmers with information, technologies, and education on how to cope with climate change and ways to contribute to GHG mitigation. This support is especially important for resource-scarce smallholders, who contribute little to climate change and yet will be among the most affected. Support from extension for farmers in dealing with climate change should focus on two areas: adaptation and mitigation, explained below. But first, it is important to define extension.

## What is extension?

Extension programs were originally conceived as a service to "extend" research-based knowledge to the rural sector in order to improve the lives of farmers. Extension thus included components of technology transfer, broader rural development goals, management skills, and nonformal education. The traditional view of extension in developing countries was very much focused on increasing production, improving yields, training farmers, and transferring technology. Today's understanding of extension goes beyond technology transfer to facilitation, beyond training to learning, and includes helping farmers form groups, deal with marketing issues, and partner with a broad range of service providers and other agencies. Agricultural extension can thus be defined as the entire set of organizations that support people engaged in agricultural production and facilitate their efforts to solve problems; link to markets and other players in the agricultural value chain; and obtain information, skills, and technologies to improve their livelihoods.

## How can extension help with adaptation and mitigation?

There are several ways that extension systems can help farmers deal with climate change. These include adaptation and contingency measures for what cannot be prevented. Extension can help farmers prepare for greater climate variability and uncertainty, create contingency measures to deal with exponentially increasing risk, and alleviate the consequences of climate change by providing advice on how to deal with droughts, floods, and so forth.

Extension can also help with mitigation of climate change. This assistance may include providing links to new markets (especially carbon), information about new regulatory structures, and new government priorities and policies.

Discussed below are three ways in which extension can help with adaptation and mitigation: technologies and management information; capacity development; and facilitating, brokering, and implementing policies and programs.

### *Technologies and management information*

Extension traditionally has played a role in providing information and promoting new technologies or new ways of managing crops and farms. Extension also links farmers to researchers and other actors in the innovation system. Farmers, extension agents, and researchers must work together on farmers' fields to prioritize, test, and promote new crop varieties and management techniques. While extension must now go beyond such methods, there is still a need for simple technology transfer in order to increase resilience to climate change and mitigate GHG emissions

Today's farmers will need to be able to quickly respond to climate change and adeptly manage risk. This will be especially challenging for extension in terms of knowledge and information systems. Farmers need to have access to this kind of information—be it climatic information, forecasts, adaptive technology innovations, or markets—through extension and information systems.

Extension agents can introduce locally appropriate technologies and management techniques that enable farmers to adapt to climate change by, for example, developing and disseminating local cultivars of drought-resistant crop varieties with information about the crops' advantages and disadvantages. Additionally, extension staff can share with farmers their knowledge of cropping and management systems that are resilient to changing climate conditions such as agroforestry, intercropping, sequential cropping, and no-till agriculture. Some of these practices have the added advantage of improved natural resource management. Tree planting can also help to improve soil, prevent soil erosion, and increase biodiversity. It is important to provide farmers with information about how the various options will potentially increase income and yields, protect household food security, improve soils, enhance sustainability, and generally help to alleviate the effects of climate change. At the same time, extension staff can play an important role in transferring indigenous technical knowledge to help farmers worldwide.

A core challenge for extension in the future is to shift from providing "packages" of technological and management advice to, instead, supporting farmers with the skills they need to choose the best option to deal with the climate uncertainty and variability and to make informed decisions about if and how to engage in new markets for carbon emissions. Some farmers will also need access to new technologies and management options in those areas where climate change renders their current farming systems inviable.

### *Capacity development*

One of extension's major activities over time has been adult and nonformal education. This role continues today and is even more important in light of climate change. In addition, extension is also responsible for providing information using techniques ranging from flyers and radio messages to field demonstrations. Recent innovative extension activities include the adult education and experiential learning approaches utilized in farmer field schools, an extension and education approach already working with farmers on issues of climate change. Climate Field Schools (CFSs) have been established

in West Java, Indonesia, to deal with climate change in agriculture. Another example is a multimedia campaign planned by True Nature Kenya and the World Agroforestry Centre that will show films and offer educational follow-up by extension agents to publicize grassroots solutions to the problems of climate change.

Climate change will initiate extreme events like sudden onset disasters and new vectors of human and livestock diseases. Evidence is emerging that the biggest impacts will be in the form of small droughts, floods, and other events that cause severe hardship but do not attract the attention of the international community. The capacity of farmers to cope with such different forms of risk will become ever more crucial, and extension efforts must pay special attention to educating farmers about their options to enhance resilience and response capacity (see also the brief on extreme events). There is a need for capacities to engage new sets of actors, including humanitarian agencies. Education must thus move beyond technical training to enhance farmers' abilities for planning, problem solving, critical thinking, prioritizing, negotiating, building consensus and leadership skills, working with multiple stakeholders, and, finally, being proactive.

Capacity development is important within extension as well. Extension agents have traditionally been trained only in technical expertise and often lack "soft" skills such as communication, development of farmer groups, systems thinking, knowledge management, and networking. To improve outcomes in rural development, farmers and extension agents need new skills that will require agricultural education and extension curriculums to include valuing and understanding the knowledge and experiences of rural people and co-learning (that is, farmers and extension agents learning together rather than extension agents training farmers in a one-way information transfer). There are many different ways to inform and educate farmers about adaptation options. Climate change adaptation funding should focus on extension systems and programs that incorporate a good understanding of what practices and skills are needed to best promote activities that help in the climate change effort and on increasing the capacity of extension agents and farmers, where needed.

### *Facilitating, brokering, and implementing policies and programs*

Another role of extension, which will be critical for climate change issues, is that of acting as an honest broker, bringing together different actors within the rural sector. Traditionally this has meant linking farmers to transport agents, markets, and inputs suppliers, among others.

With climate change, it will be increasingly important for the extension system to link farmers and other people in rural communities directly with voluntary and regulated carbon markets, private and public institutions that disseminate mitigation technologies, and funding programs for adaptation investments. Increased access to meteorological information will be imperative. Extension also has an enormous challenge in bringing together farmers' concerns and those of other actors as they address both climatic and market uncertainties together. Extension has the chance to make a significant contribution to overcoming this gap through enhanced farmer decisionmaking.

Extension agents may also play a role not only in brokering, but also in assisting farmers in implementing policies and programs that deal with climate change mitigation. For instance, regarding carbon credits, extension agents could be employed to educate farmers in their area; assist in forming community groups; link farmers to governmental, nongovernmental, and private organizations at the national and international levels; and perhaps assist with proposal preparation or negotiations with other players.

## Why extension rather than another institution for climate change?

Gathering information is expensive. Extension has proven itself to be a cost-effective means of bringing about greater economic returns for farmers with significant and positive effects on knowledge, adoption, and productivity. Studies of extension productivity report rates of return from 13 to 500 percent. A recent study demonstrated that receiving at least one extension visit in Ethiopia reduced smallholders' likelihood of being poor by 10 percent and increased consumption growth by 7 percent. Extension is thus a cost-effective tool that can play an important role in dealing with climate change while at the same time helping to increase productivity and reduce poverty.

## Suggested negotiating outcomes:

Extension has a major role to play in helping farmers adapt to and mitigate climate change. To capture this potential role, adaptation and mitigation funds could be used to support extension efforts that deliver new technologies, information, and education about increasing carbon sequestration and reducing GHG emissions. Traditionally extension has worked to promote new technologies and management techniques, educate farmers, and act as a facilitator or broker for rural communities. Now, too, extension can help link practice in the field to new policies regarding climate change. All of these roles can be exploited in a cost-effective way to help resource-poor smallholders deal with the issues of climate change that will so radically affect their livelihoods. Perhaps the most important purpose for extension today is to bring about the empowerment of farmers, so that their voices can be heard and they can play a major role in deciding how they will mitigate and adapt to climate change. ■

**For Further Reading: D. Birkhaeuser et al., "The Economic Impact of Agricultural Extension," *Economic Development and Cultural Change* 39, no. 3 (1991): 607–640; S. Dercon et al., *The Impact of Agricultural Extension and Roads on Poverty and Consumption Growth in Fifteen Ethiopian Villages*, Discussion Paper No. 840 (Washington, D.C.: International Food Policy Research Institute, 2008).**

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