THE CHICAGO COUNCIL ON GLOBAL AFFAIRS

Renewing international extension to equip farmers for a changing climate

Gloria Dabek

September 2021

Introduction

Climate change is causing more extreme weather events such as flooding, droughts, and heat waves. Farmers are seeking to quickly adapt to a crisis that is worsening with time. Tools that were previously used by farmers, however, may no longer be effective to combat changing conditions. Agricultural research and development (R&D) is essential for generating the necessary tools and knowledge to fight climate change.[1] Agricultural extension plays an equally critical role in delivering those findings and innovations to farmers, ensuring they have the best information and tools available for success. With smallholder farmers producing one-third of the world's food, the livelihoods of millions of farmers and the food security of billions of people are at risk.[2]

The climate crisis requires a global response, and it is now more urgent than ever to equip farmers worldwide to address these challenges. The United States has a long history in international agricultural extension with mixed results, as some initially successful efforts did not endure. With our strong R&D and extension infrastructure, the United States has the opportunity to reevaluate and bolster its international extension efforts and provide global leadership to more effectively deliver on taxpayer dollars and provide smallholder farmers the assistance they need.

Farmers require accurate and context-appropriate innovations and knowledge to address climate challenges and provide food-secure futures for themselves, their communities, and the world. Rather than a linear pipeline from researchers to farmers, research and extension should instead be seen as a feedback loop. Research should be driven by the needs of communities, with communities providing feedback on how new knowledge, practices, or innovations affect them, thus

A comprehensive definition of international extension

International agricultural extension and advisory services (referred to in this brief as "extension") are traditionally viewed as services that extend research-based findings to field-based education and application for farmers and producers. While this is a critical function of extension, its definition can be broadened to include 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."

Kristin E. Davis, "Agriculture and Climate Change: An Agenda for Negotiation in Copenhagen," policy brief (Washington, DC: International Food Policy Research Institute, May 2009), http://ebrary.ifpri.org/utils/getfile/collection/p15738coll2/id/29421/filename/29422.pdf.

driving further research. A revised extension agenda must account for the abundant possibilities provided by information and communications technology (ICT) as well as ensure new innovations and knowledge are sustainable environmentally, financially, and locally. While this brief is not intended as a comprehensive review, it examines current US international agricultural extension efforts, identifies gaps, examines best practices, and proposes policy recommendations for a new extension agenda.

US international extension today

The United States is perhaps best known for its robust domestic agricultural research and extension system rooted in land-grant universities (LGUs). As the climate crisis increasingly affects farmers, the U.S. Department of Agriculture's (USDA) Climate Hubs have also undertaken research and extension to ensure information and innovations reach US farmers. Research from both LGUs and the Climate Hubs is occasionally leveraged or delivered to farmers internationally, but the U.S. Agency for International Development's (USAID) Feed the Future Innovation Labs, colocated at US universities, specialize in examining potential solutions to global food security and agriculture issues. In addition, USAID's Farmer-to-Farmer program harnesses the expertise of US volunteers for technical assistance to communities and farmers in more than 30 countries. USAID also funds several extension-specific projects, with the Developing Local Extension Capacity (DLEC) being the most prominent. DLEC is a five-year project that has worked in several countries to diagnose and address extension needs as well as build communities of practice that continue to advocate for extension. Several other US agencies, such as the U.S. International Development Finance Corporation and the National Aeronautics and Space Administration (NASA), work on extension and climate data, which could be better coordinated with other US government efforts in the future. The United States also contributes to several global initiatives, such as the CGIAR system and the new Agriculture Innovation Mission (AIM) for Climate, to spur global agricultural R&D related to climate action, with extension as a potential component.[3]

Many extension efforts have taken a top-down approach, unintentionally excluding the communities they intended to help.

Reevaluating extension to deliver climate and agricultural R&D to all farmers

Warnings about a climate crisis—most recently from the Intergovernmental Panel on Climate Change's (IPCC) 2021 report, which deemed the situation "code red"—are escalating.[4] As a result, delivering effective knowledge, practices, and innovations to all farmers is even more critical. The climate crisis threatens food security and farmer livelihoods through more frequent extreme weather events such as longer drought and flood seasons and increased spread of wildfires as well as less predictable weather conditions overall. Many crops, including staples such as wheat and maize and nutrient-rich fruits and vegetables, are susceptible to lower yields as average temperatures increase.[5] Smallholder farmers often suffer the worst effects of climate change despite contributing the least to the problem. Women, who comprise a large portion of smallholder farmers, disproportionately suffer these effects. Mitigating, adapting to, and increasing resilience to the effects of climate change will require new and indigenous knowledge and practices scaled and resourced to address the crisis.

The United States has a robust agricultural R&D system and should better globally share its findings on climate change. At the same time, it should reexamine the process for engaging with communities abroad, including smallholder farmers. Reflecting a larger problem with development and international assistance, many extension efforts have taken a top-down approach, unintentionally excluding the communities they intended to help. To sustainably deliver US research to smallholder farmers abroad, a different approach to international extension is needed.

Challenges and opportunities in extension

Extension infrastructure varies from country to country. As a result, there are no one-size-fits-all policies on how the United States can better support international work. Extension efforts require diligent preparation and contextual understanding. The following best practices provide a framework for international extension efforts and a new extension agenda, gleaned from current practitioners, academics, and extension specialists.[6]

Scale considerations

Scale—defined in this context as the ability to integrate new knowledge, innovations, and practices in a sustainable manner—is often not considered early enough in the research process. Many current research projects look at how their research might be applied only *after* project design or completion. Without clear direction on how the research would benefit farmers, extension efforts often stall once introduced to farmers or fail to benefit the community in the long term despite best intentions.

> By aligning stakeholder incentives and prioritizing farmer adoption from day one of the research process, both R&D and extension can become more effective.

Many questions of scale are related to incentives among stakeholders (researchers, farmers, extension agents, country governments, the private sector, and others) and the question of adoption by farmers. Untangling the intricate web of incentives and focusing on the beginning of the research process reveals that this core question is rarely prioritized, with important consequences. For example, if researchers are primarily incentivized to research for peer-reviewed publication, how could research reflect community priorities? If research does not reflect community priorities, what incentives exist for farmers to seek out the new information or innovations? By aligning stakeholder incentives and prioritizing farmer adoption from day one of the research process, both R&D and extension can become more effective. Ultimately, this will require a shift of power and the breakdown of barriers between US institutions and the communities they seek to serve.

Bottom-up approaches

The importance of bottom-up approaches for extension has been well recognized, but these approaches remain difficult to implement. They often require committed community investment for many years rather than finite project cycles to build trust and negotiate realistic and tailored expectations of success.[7] The approaches may also often be messy and iterative, operating outside of traditional results frameworks. Bottom-up approaches also importantly recognize existing local individual and community assets rather than only gaps. Reconciling the effectiveness of these bottom-up approaches with a development model focused on short-term, clear-cut results can be difficult. But because more local control of the extension agenda enables the most appropriate innovations and information to reach their targets and endure, these approaches are worth the effort and can lead to greater sustainability.

In delivering research findings internationally, US extension efforts should ensure that the findings are context-specific, translated in a way that makes sense to the community, and fulfill needs or preferences of the intended beneficiaries. For instance, investing in the development of a pest-resistant grain that grows well in a particular area but is not taste tested with the farmers or community might decrease uptake of that innovation. Integrating more touchpoints with smallholder farmers, such as through farmer associations or regional networks, is a critical first step in restructuring research and extension to focus on farmer priorities. USAID's DLEC project, for instance, saw great success in establishing communities of practice that gather national, regional, and global extension systems to collaborate and advocate for stronger extension and advisory services, ultimately reaching 1.3 million farming households.[8] The United States also has many strong examples of this approach within domestic extension through the land-grant system and, specific to climate, USDA's Climate Hubs.

Capacity development

Another challenge is ensuring that future US international extension efforts support communities, institutions, and networks for sustained impact while they continue to efficiently deliver helpful innovations and knowledge to farmers. One method for capacity development is through US support of country-led agricultural R&D through National Agricultural Research and Extension Systems (NARES) and universities. Another key to strengthening local capacity is empowering extension agents so they can provide services to hundreds of farmers and curate wide-ranging information from sources with varying levels of contextual understanding. Finally, capacity development also entails ensuring farmer associations and cooperatives have the power and resources necessary for robust representation in decision making within research and extension. While these individuals and institutions are perhaps unique to extension, capacity strengthening should also consider many other local, subnational, and national entities.

Because existing agricultural R&D and extension infrastructure varies so greatly by country, a best-fit approach is crucial. This almost certainly includes supporting public and private-sector efforts as well as nontraditional models that combine aspects of both, in addition to civil society. Climate issues can benefit from improved R&D and extension, but sufficiently strong incentives for private-sector involvement may not always exist. Innovative financing mechanisms can serve as new opportunities for delivering important, relevant findings to smallholder farmers who are on the front lines of combating climate change but often lack the income necessary to pay for private-sector services. One Acre Fund, for instance, bundles services such as farmer training in a social enterprise model funded mostly through farmer purchases while donors cover the remaining costs.[9]

More complete and climate-accountable metrics

Adoption rates of a particular practice or innovation are a primary metric of extension success. While adoption rates provide some information, the reality of success is much more complex. Many smallholder farmers feel loyal to extension agents and will adopt new methods or innovations out of this loyalty, even when the intervention does not actually provide any benefits.[10] Traditional and existing metrics also often do not fully capture the nutritional, cultural, environmental, or sustainable values of new practices or innovations to a community. More research is certainly needed, but environmental health metrics such as soil health are beginning to emerge. These metrics are vital for capturing a complete picture of extension success.

> The next generation of extension agents must curate what data could be helpful for a particular farmer.

Digital capabilities

Digital capabilities can propel progress by putting relevant and curated data in the hands of farmers in an accessible format. All modalities—including radio, video, mobile phones, and the internet—should be considered for enhancing data access. Use of digital extension can scale information more cheaply, better facilitate farmer feedback, more effectively develop local capacity through data sharing, and enable tracking of metrics beyond productivity. For instance, Scientific Animations without Borders (SAWBO) translates agricultural extension information into animations overlaid with different language options.[11] A system and mobile app called LandPKS, originating from a USDA–USAID partnership nearly a decade ago, allows farmers access to open-source information to improve land management and soil health.[12]

While data sharing and accessibility for farmers is an important first step, a critical next step must include meaningful translation of these data by a human intermediary. Giving farmers access to raw data on their crops is not useful unless it is accompanied by interpretation of that data. The next generation of extension agents must curate what data could be helpful for a particular farmer. Most importantly, digital capabilities should empower, not exploit, farmers. Existing data security gaps need to be addressed, as farmers must be able to trust that data on their livelihoods are safe and protected. This requires high international security standards that do not yet exist.

Policy recommendations

The ultimate goal of the proposed policy recommendations is to facilitate delivery of agricultural R&D findings that meet farmer and community needs and preferences while fostering climate change resilience, adaptation, and mitigation. As part of a new extension agenda, USAID and other agencies need the resources to consider scale, focus on bottom-up approaches and capacity development, account for climate impacts, and invest in digital capabilities to support farmer livelihoods and global food security in the face of a climate crisis.

As part of a new extension agenda, USAID and other agencies need the resources to consider scale, focus on bottom-up approaches and capacity development, account for climate impacts, and invest in digital capabilities to support farmer livelihoods and global food security in the face of a climate crisis.

1. As leaders of the US government's primary research on international food security and agriculture, **USAID Feed the Future Innovation Labs should be better resourced to consistently prioritize farmer and community needs and preferences at every stage of the research process.** Encouraging farmer- and community-centered research design will improve extension of that research, yielding higher returns on taxpayer investment.
   - Congress should appropriate additional funds for a **new Feed the Future Innovation Lab focused on translating data meaningfully for smallholder farmers and on educational interventions.** While many existing Innovation Labs focus on commodities, products, or technologies, less tangible knowledge can be just as influential in adapting to or mitigating climate change. For instance, data on local weather or soil health can be extremely useful when confronting the climate crisis. A new Innovation Lab could examine how to better disseminate and commercialize this information, including digital/ICT modalities.
   - **Congress should allocate modest increases in resources for Feed the Future Innovation Labs to add capacity for envisioning how innovations or knowledge might be used by intended beneficiaries and communities. In turn, this vision should be used to guide lab research.** This will ensure that research is centered around the needs and preferences of targeted communities. The emerging Innovation to Impact project at the Soybean Innovation Lab, while not yet operational, might be a good example of how to incorporate needs-based research into each lab.

2. Following the successful conclusion of the DLEC project, USAID has an opportunity to continue and enhance extension work, especially climate-related extension. **Future work should build on DLEC success by taking further steps to engage with smallholder farmers so that their priorities dictate extension efforts from day one.**
   - Capacity development is critical to future extension projects. USAID should invest in strengthening regional research and innovation networks, including NARES, farmer associations and cooperatives, and other local institutions so that innovations and findings can be fully leveraged across communities.
   - Metrics measuring future extension project success should include those related to climate such as soil health that are relevant to the community. This will provide a holistic perspective of success accountable to climate impacts. It will also more fully demonstrate the broad benefits of US extension efforts.
   - Future extension projects should explore innovative finance mechanisms for extension work in addition to the traditional grant-funding model, potentially through small pilot projects. Options such as social enterprise models unite aspects of the public and private sectors and provide ample incentives for both extension providers and farmers to use services.

3. Building on existing success, **Congress should consider additional investment in the Farmer-to-Farmer program above current funding levels.** The program first identifies local hosts—whether individual farmers, cooperatives, agribusiness, or others—in the countries in which it operates. Local hosts help the Farmer-to-Farmer program assess what technical assistance, and thus volunteers, might be most useful to the community. Additional funding could allow the program to operate in more countries as well as assist host organizations in sustaining the technical assistance provided by the program.
4. As signaled by initial administrative and congressional appropriations requests, **Congress should increase investment in USDA Climate Hubs to increase their capacity to (1) share relevant climate data with USAID and (2) engage in limited international work due to the nature of climate change.** The Climate Hubs themselves provide climate-based extension and could potentially share best practices with USAID. When possible, this data should also be shared on easily accessible public platforms with civil society and local organizations. These local groups can then curate and translate this data in a way that is helpful to smallholder farmers. Public availability of this data should be accompanied by a human intermediary to translate the data into practice. FarmStack, a nascent initiative from Digital Green that seeks to put data in the hands of farmers, could serve as an example of an emerging public platform to facilitate this.[13]
5. **The NASA Harvest program should receive an increase in funding.**[14] This program utilizes satellite earth observations to benefit food security and agriculture. With additional funding it could foster long-term capacity at partner institutions in target countries. The goal is for these countries to implement their own operational systems that provide up-to-date observations to forecast climate hazards and crop production to local farmers.
6. **Congress should elevate climate-related extension as a priority in the next reauthorization of the Global Food Security Act, recognizing that both climate and extension are critical to food security.** Extension is often overlooked; without delivery of knowledge and innovation outputs, money spent on agricultural R&D is ineffective. Especially with the ever-heightening urgency of the climate crisis, innovations and knowledge that preserve livelihoods and meet community needs must be effectively deployed for a food-secure future.
7. **Congress should fully appropriate the provision entitled "Partnerships to Build Capacity in International Agricultural Research, Extension and Teaching" authorized in the 2018 Farm Bill.** This provision promotes research exchange and facilitates extension efforts between US institutions and partner institutions in other countries. It strengthens country capacity through national agricultural research and extension systems (NARES) and education. It also establishes the USDA National Institute of Food and Agriculture (NIFA) program that provides opportunities for interns and fellows at US institutions to serve or study at agricultural education institutions in lower- and middle-income countries.

Endnotes

1 Molly Jahn, "New Solutions for a Changing Climate: The Policy Imperative for Public Investment in Agriculture R&D," policy brief (Chicago: The Chicago Council on Global Affairs, August 2020), https://www.thechicagocouncil.org/sites/default/files/2020-12/report_new-solutions-for-changing-climate_0.pdf.

2 Sarah K. Lowder et al., "Which Farm Feeds the World and Has Farmland Become More Concentrated?" *World Development* 142 (June 2021): 105455, https://doi.org/10.1016/j.worlddev.2021.105455.

3 U.S. Department of State, Office of the Spokesperson, "Launching Agriculture Innovation Mission for Climate," fact sheet, April 23, 2021, https://www.state.gov/launching-agriculture-innovation-mission-for-climate.

4 Intergovernmental Panel on Climate Change, "Summary for Policymakers," in *Climate Change 2021: The Physical Science Basis*, edited by V. Masson-Delmotte et al. (Cambridge: Cambridge University Press, 2021), https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf.

5 Cheikh Mbow et al., "Food Security," in *Climate Change and Land: An IPCC Special Report on Climate Change, Desertification, Land Degradation, Sustainable Land Management, Food Security, and Greenhouse Gas Fluxes in Terrestrial Ecosystems*, edited by P.R. Shukla et al. (Geneva: Intergovernmental Panel on Climate Change, 2021), https://www.ipcc.ch/site/assets/uploads/sites/4/2021/02/08_Chapter-5_3.pdf.

6 The included best practices, in addition to the policy recommendations, are heavily informed by consultations with over 40 key stakeholders in the extension space. Ranging from government to implementing organizations to international research institutions to academic experts, these consultations provided a foundation for policy recommendations.

7 Justin Jagosh et al., "A Realist Evaluation of Community-Based Participatory Research: Partnership Synergy, Trust Building and Related Ripple Effects," *BMC Public Health* 15, 725 (July 2015), https://doi.org/10.1186/s12889-015-1949-1.

8 "Looking Back – Project in Review," Feed the Future, accessed September 16, 2021, https://view.ceros.com/ifpri/dlec-project-in-review/p/1.

9 "Home," One Acre Fund, accessed September 16, 2021, https://oneacrefund.org.

10 Fallys Masambuka-Kanchewa et al., "Gatekeepers in Agricultural Extension Research: A Retrospective Analysis," *Journal of International Agriculture and Extension Education* 27, no. 4 (December 2020): 94–110, http://doi.org/10.5191/jiaee.2020.27494.

11 "About," Scientific Animations Without Borders, accessed September 16, 2021, https://sawbo-animations.org/about.

12 "Home," LandPKS, accessed September 16, 2021, https://landpotential.org.

13 "Home," FarmStack, accessed September 16, 2021, https://farmstack.co.

14 "Home," NASA Harvest, accessed September 16, 2021, https://nasaharvest.org.

The Chicago Council on Global Affairs is an independent, nonpartisan membership organization that provides insight—and influences the public discourse—on critical global issues. We convene leading global voices, conduct independent research, and engage the public to explore ideas that will shape our global future. The Council is committed to bringing clarity and offering solutions to issues that transcend borders and transform how people, business, and governments engage the world. Learn more at thechicagocouncil.org and follow @ChicagoCouncil.

Chicago Council on Global Affairs
Two Prudential Plaza
180 North Stetson Avenue
Suite 1400
Chicago, Illinois 60601