Edward R. Carr

Small Farmers, Big Impacts

While the development community has recently begun the turn toward climate-sensitive programming, climate-related efforts have focused on big transformations and big polluters. Energy generation and deforestation are easily identified sources of greenhouse gas emissions for which we have data and policy tools, and therefore a certain degree of comfort. Certainly, global emissions are greatly influenced by energy generation, distressing rates of deforestation in what remains of the world's tropical forests, and other large sources of greenhouse gas emissions. However, the future of development's work at the intersection of climate change and human well-being lies not in an exclusive focus on big drivers of change, but in a broader engagement that includes a focus on the ways in which the livelihoods decisions of the rural poor might exacerbate or ameliorate the greenhouse gas emissions that shape climate change. The convergence of two fallacies have led to a lack of focus on the individual and community decisions that affect climate-related development efforts: a fallacy of stationarity, enabled by our limited understanding of lives and livelihoods of the rural poor in the developing world, and a fallacy of scale that results from the particular ways in which we have come to our understandings of these livelihoods and their potential impact on climate.

The Global Poor Keep Adapting

By one global estimate,[1] as many as 800 million rural dwellers consume less than the equivalent of a dollar's worth (in 1993 values) of goods each day. This population gets half or more of its income from agricultural labor and devotes substantially more than half of its consumption to staple foods. Generally speaking, when we use a climate-change lens to think about these people and their livelihoods, the conversation turns to adaptation—and how development institutions will help resource-poor, capacity-challenged populations address the

1 Michael Lipton, "The Family Farm in a Globalizing World: The Role of Crop Science in Alleviating Poverty," IFPRI, 2020 Discussion Paper 40, 2005.

A Pakistani woman harvests a crop of wheat on the outskirts of Islamabad on April 13, 2009. | AFP Photo: Farooq Naeem

stresses that climate change will place on their livelihoods. We tend to implicitly assume that these populations are generally reactive to external events, focused on short time horizons, and living without sufficient information (even about their local contexts). Thus, their future decisions and adaptations would depend somewhat on external interventions and resources.

A large body of qualitative literature[2] convincingly challenges these assumptions. Among the rural poor in the Global South—especially those who make a living from rain-fed agriculture—the distinction between a livelihood and an adaptation to climate variability and change is nearly nonexistent. Rural farmers have long adjusted to new environmental and economic conditions in the course of their livelihoods, and they will continue to do so in the context of economic and environmental change going forward. Many have done so without development assistance, and indeed with little resources at all, for generations. Take, for example, the last two centuries of shifting livelihoods in rural parts of Ghana's Central Region.[3] Over this timespan, without the benefit of crop science, agricultural infrastructure (such as irrigation), or significant extension, farmers have managed the

2 For recent examples of such work, see James Scott, *The Art of Not Being Governed: An Anarchist History of Upland Southeast Asia* (New Haven: Yale University Press, 2010) and William Critchley, *More People, More Trees: Environmental Recovery in Africa* (Practical Action, March 2011).

3 For a detailed discussion of this case, see Edward R. Carr, *Delivering Development: Globalization's Shoreline and the Road to a Sustainable Future* (New York: Palgrave Macmillan, 2011).

near-complete transformation of their agroecology. Today, in some villages, 80% of the crops are non-African domesticates introduced either through colonialism or later agricultural development efforts. Over the past half century, there is clear evidence of a decline in annual rainfall accompanied by increasing variability in its timing and distribution. Though these agricultural and environmental transformations carried significant risks associated with invasive species, new pests, and engagement with new and often uncertain markets, farmers in this region avoided economic and ecological collapse while continuing to make a living from the land. It is a remarkable story, and while these outcomes are specific to one part of West Africa, they have echoes in many other places around the world now and likely into the future. Climate variability, climate change, and globalization continue to influence livelihoods, and local populations continue to adjust. As they do, they will change such fundamental drivers of climate change as land cover and biogeochemical cycling—thereby contributing to the drivers of human vulnerability to climate change in future years.

Development programs must better understand what people are already doing to adapt to climate variability and change.

Livelihoods Decisions Are Rarely Made Alone

The cycle of adaptation and change is largely self-evident to any development practitioner or scholar who has spent time thinking about rural livelihoods and their impacts on the environment. Yet we pay precious little attention to the potential impact of these changes in our programming because we fail to appreciate the aggregate effect that a series of local decisions might have. To understand the potential pathways of adaptation in a given household or community requires intensive fieldwork with a limited number of people. For example, adaptations and livelihoods are variable, even at the intra-household level.[4] Often men and women farm different crops, or emphasize different crops, on their respective farms. Therefore, their adaptation decisions may differ depending on the needs of those crops, with divergent biophysical impacts. Thus, our data on potential changes and their effects on the natural world tend to be small-scale and locally specific. If a single farmer, or a community of farmers, makes adjustments to their agricultural strategies, the impact on global biogeochemical cycles is extraordinarily small, and therefore we do not spend much time worrying about it. However, individual farmers, and indeed entire farming communities, are not islands. If one community is making particular shifts in agricultural strategy, it is likely that many communities within that agroecological zone are experiencing similar stresses and making similar changes. While one farmer may not have a large impact on the biophysical world, tens or hundreds of thousands of farmers shifting the land cover on potentially millions of hectares certainly will.

For example, one study in the West African savannah in Senegal noted that maize fields

4 For example, see Edward R. Carr, "Between Structure and Agency: Livelihoods and Adaptation in Ghana's Central Region," *Global Environmental Change,* 18.4 (2008), 689–699.

Indian women trained through a USAID program prepare mango bars using a solar-powered dryer unit. Solar dryers in India enable farmers to efficiently use energy to turn excess produce into food and income off-season. | Photo: Heather Sullivan/USAID

sequestered an annual mean of 7.5 more tons of carbon per 100 m^2 than millet fields[5]—not much in the global scheme of things. However, under these conditions, were a mere 10% of Senegal's 121,235 hectares of maize converted to millet due to environmental stress, the mean impact would be the release of more than 900,000 tons of carbon into the atmosphere. A similar 10% shift in neighboring Mali would result in the release of nearly 4 million extra tons of carbon, or the equivalent of a year's emissions from an average coal-fired electricity plant. Just as some suggest there is a "Fortune at the Bottom of the Pyramid"[6] that might be made by selling to the poor, so too is there a lot of carbon to be sequestered—and linked climate and development benefits to be reaped—by working with the poor.

Addressing the Challenge

Given the potential cumulative effect of such livelihoods decisions, climate-sensitive development programs must better understand what people are already doing to adapt to climate variability and change, and also the types of changes that current programs might be fostering. We must determine whether these adaptations have an amplifying effect on emissions or if the various impacts of these

5 Raphael J. Manlay, Jean-Luc Chotte, Dominique Masse, Jean-Yves Laurent, and Christian Feller, "Carbon, Nitrogen and Phosphorus Allocation in Agro-Ecosystems of a West African Savanna—III: The Plant & Soil Components under Continuous Cultivation," *Agriculture, Ecosystems and Environment*, 88.3 (2002): 249–269. The study also calculated the impact of different crops in terms of nitrogen and phosphorus cycles.

6 C.K. Prahalad, *The Fortune at the Bottom of the Pyramid: Eradicating Poverty through Profits* (Upper Saddle River, NJ: Wharton School, 2004).

A farmer fetches corn from a mud silo at Janjori-Kukuo in Ghana. With USAID support, farmers in Ghana have improved their crop production as climate change puts additional stress on agricultural systems in Africa. | Photo: Louis Stippel/USAID

adaptations cancel each other out or even neutralize emissions from other sources. Without adequate information *within* given livelihoods and agroecological zones, it is impossible to estimate the impact of changes *across* agroecological zones—that is, to understand if the aggregate emissions impacts of change in one zone add to or ameliorate the emissions changes in another.

A two-pronged effort best addresses this challenge, focusing on the collection of new data on livelihoods and their environmental impacts while putting programs and mechanisms in place to make use of this information and to incorporate sensitivity to small-scale climate impacts into development efforts. First, by employing programs such as the Partnerships for Enhanced Engagement in Research or the Collaborative Research Support Program, USAID might catalyze the systematic documentation of the livelihoods and adaptation decisions of the rural poor to build on and deepen existing efforts by the Famine Early Warning Systems Network. Engaging the academic community is one step, but the initiative should also mine existing data and consider the crowdsourcing potential of new information technologies, which can be employed to extend our knowledge of the various biophysical impacts of livelihoods and adaptation decisions. We can gain new insights into crop selection, agricultural method, and patterns in migration from rural to urban areas (which can open up new fallow land—a form of land-cover change), to name a few.

Once the character and magnitude of such impacts are understood, we can identify alternative livelihoods options and adaptation pathways with more limited climate impacts (or even climate

benefits), and use our enhanced understanding of livelihoods and adaptation decision-making to identify the incentives necessary to motivate the shifts to such pathways.

In the implementation arena, USAID already has many programs and practices in place that, with minor adjustments, could build development programs that are sensitive to aggregated individual and community impacts. For example, for their climate-change adaptation programs, bureaus and missions could demand that vulnerability assessments (required for any adaptation program) take into account what the beneficiaries of development will be doing at various points in the future, instead of assuming a continuous line from the present extending forward in time. This will allow us to determine if the proposed project actually serves as a net driver of the changes to which people are adapting, and to take action to ameliorate such issues. On the mitigation side, the Enhancing Capacity for Low Emission Development Strategies program can use this information to assess the import of rural livelihoods and adaptation to the overall emissions profile of a given partner country, as well as the likely future import of these emissions, to build appropriate rural livelihoods and adaptation programs in those countries.

While the issues of rural livelihoods, adaptation, and climate change present a thorny frontier for development, the potential collateral benefits of addressing these challenges are significant. By driving USAID and its development partners toward deeper engagement with our rural beneficiaries, these challenges present an opportunity to better understand the capabilities of the rural poor, to see them as potential solutions to development challenges instead of problems to be solved. The world has more than seven billion people living on it. Surely there are innovative, cheap, actionable ideas out there that we have not yet heard about. We will only find them if we listen.

Coffee plants grow under the protective shade of native trees at a certified farm in Guatemala. USAID supports certification of a number of forest products, leveraging markets to improve prices for growers, conditions for workers, and habitat for birds and other species. | Photo: Charlie Watson/ Rainforest Alliance

Edward R. Carr *is an American Association for the Advancement of Science (AAAS) Science and Technology Policy Fellow serving as a climate science advisor with the Global Climate Change team in USAID's Bureau for Economic Growth, Agriculture and Trade. The views expressed in this essay are his own, and do not necessarily represent the views of the United States Agency for International Development or the United States Government.*