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Adapting Small-Farm Systems to Climate Change: Preliminary Results from Participatory Community Assessments in Bajura District, Nepal

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Research Brief

Feed the Future Innovation Lab for Collaborative Research on Adapting Livestock Systems to Climate Change

Abstract

Western Nepal is a remote region that is home to a wide variety of small farm and livestock production systems. Communities here lack direct access to a suitable road infrastructure, and thus are isolated from the modern world. Farm families are often poverty stricken. Western Nepal is also enduring significant climate change, resulting in warmer and drier conditions that affect crop and livestock productivity. Our research team used Participatory Rural Appraisal (PRA) to convene the members of four small-farm communities in Bajura District, identify their priority problems and analyze how the production systems function. We then connected the prioritized problems to their sources, whether poverty or climate change, and charted a way forward that catalyzes an adaptation process to improve human welfare. Preliminary PRA results indicated that the top ranked problems across all four communities were: (1) Shortages of drinking water; (2) declining crop productivity and hence growing food insecurity; (3) the need to build capacity for people to find off-farm employment to increase incomes; and (4) the need to gain more income from livestock commercialization. Of these problems, declining crop productivity is most clearly connected to climate change because most crops are rainfall dependent. The other problems are more related to poverty, population growth, and a general lack of development investment. The PRA exercises helped formulate four Community Action Plans. These plans provide blueprints for effecting change and are the basis for future research that will document the effectiveness of interventions.

Priority Problems Facing Nepalese Farmers and their relation to Climate Change

Research conducted over the past two years by our team's climate scientists at Utah State University has revealed that western Nepal is particularly vulnerable to climate change. In particular, air temperatures are projected to become warmer and precipitation is expected to decrease. What has been less clear is the extent to which local people perceive and understand climate change and its effects. Researchers also have a limited understanding of what interventions could be most cost-effective and technically useful to mitigate the possible impacts of climate change on crop and livestock production. Our objectives in this first phase were thus to determine:

1. Priority problems for representative communities;
2. How priority problems are related to climate change; and
3. Sustainable solutions that could address the priority problems.

Terraced hillside with village. (Photo credit: Arjun Basnet)

Such objectives appear simple, but small-farm systems are complicated. The residents are typically affected by poverty, population pressure, and lack of development investment, so climate change must be considered in combination with other problems of daily life.

The Challenges of Small-farm Life in Western Nepal

We wanted to conduct field research in a stressed region in the mountainous region of western Nepal. We selected Bajura District, a location that is 2,188 km2 in size and home to about 137,000 people. Out of 75 districts in Nepal, Bajura District is among the poorest and most food-insecure.

People are found in units called Village Development Committees (VDCs). These VDCs are very far from roads and large towns. The district agricultural offices are located in Martardi and transportation is very limited. A person from one of our eight VDCs would need to walk more than 10 hours simply to get to district headquarters at Martardi town. Thus, the reach of agricultural extension into most VDCs is minimal.

While there is considerable local variation in farming resources and practices, a typical small farm may consist of several acres of non-irrigated cereal production (wheat, barley, millet, maize) on terraced hillsides, supplemented by a few acres of sub-irrigated rice production in valley bottoms. Home grown grains constitute the main food supply for households year round. Households vary in terms of food self-sufficiency; a few have a year-round supply of grains while the vast majority has a supply lasting only two to six months each year. Traditions for land tillage, planting, and harvest are maintained; crop varieties have been invariant for as long as people can remember.

Livestock holdings are meager. Each household typically owns around a half dozen goats, some of which are sold each year as meat animals. A bull (ox) is used for ploughing fields. A cow with a calf has a high cultural value in the local religious customs. Cow milk is consumed in the form of yogurt. Due to religous convictions, cow milk is never boiled.

A typical house is a two-story structure. The family lives upstairs and livestock live downstairs. The upstairs has a few windows and but there are no windows downstairs, providing little ventilation for people and no ventilation for livestock. Hygiene for the local people is poor and animals are kept in substandard conditions. Animals are sometimes taken for grazing, but forage is also supplied via cut-and-carry methods. Off-farm employment has been increasing because households need money to buy food and other supplies. It has recently become more common that some younger family members must leave home for extended periods to work in India. Remittances from such workers are important in the household budget.

A Participatory Approach Reveals Local Knowledge and Identifies Needs

Our unit of analysis was a cluster within VDCs. Henceforth we refer to clusters as communities. There are 27 VDCs in Bajura District, and each VDC is home to a number of communities where 200 to 250 households reside. We selected a total of eight VDC communities that were most similar in terms of climate, types of farming systems, access to development institutions, and various other socioeconomic indicators. We then divided the eight communities into four pairs for a comparative analysis. Four of the communities would receive a full complement of interventions and more intense study, while the other four would simply be studied as paired control locations lacking interventions.

The first stage of research was to implement a Participatory Rural Appraisal (PRA) among the four communities selected for intense study and intervention. It is sometimes assumed that PRA is only useful for development work, but we have found it to be very useful in the diagnostic phase of a research project. All stages of the PRA were implemented— and by investing considerable time and effort, trust-building occurred between the researchers, development agents, and the communities. Communities then became co-owners of the research and development process. A six-member field team, with a mix of local and non-local participants, was assembled to conduct the PRAs. Members included a PRA expert, a technical advisor, a monitoring and evaluation manager, and a district coordinator for HKI. The team was thoroughly trained in PRA theory and application prior to conducting their work.

Our PRA process included social resource mapping, transect walks, farm sketches, disadvantaged group mapping, historical community timelines, gender daily calendar, seasonal farming calendars, institutional and stakeholder analysis, problem-identification and ranking matrices, solution-identification and ranking matrices, focus group discussions, and drafting a community action plan (CAP). There was an average of 60 participants for each PRA, and each PRA took five days to complete. All participants were aged 18 or older and included men, women, and representatives from each socioeconomic class. We preceded the PRA protocol by providing research-based information on climate change, and then this topic was thoroughly discussed with the participants. We also adapted our PRA approach to accommodate some of the local socio-economic realities—namely strong social stratification according to gender and caste. The typical PRA process includes plenary sessions where problems and solutions are identified and the CAPs are drafted. We adapted the PRA process by adding break-out groups according to gender and caste. These breakout groups allowed women to speak freely and lower-caste members (i.e, Dalit) to speak freely. This input was then channeled back to the plenary sessions so that group priorities and plans could be modified accordingly.

Community Members Perceived a Changing Climate, but Had No Understanding of "Climate Change" as Fact

The PRA process allowed much discussion to occur; in some cases we suspect that certain topics had not been previously reviewed by the community in such an open forum. One interesting finding was that while community members had observed many indicators of a changing climate around them, they were completely surprised to learn that the outside world was now confronting climate change as an accepted reality. Locals were noticing that temperatures were warmer earlier in the growing season, winter snow pack was declining, growing-season rainfall was becoming more variable, and certain types of insects were becoming more abundant - but they did not know why these changes were happening.

However, once communities were informed that climate change was a reality for their region and the world, the discussions began to shift. Now there was a rationale for communities to consider strategic adjustments in farming practices and other aspects of their lives with the expectation that the recently observed trends were likely to continue. While the reality of climate change did not affect the rankings of priority problems, it would affect the suite of possible solutions to those problems.

Priority Problems Reflect Climate Change and Other Challenges

The four PRA communities were very similar in terms of the top priority problems and solutions faced by the people. These are ranked as follows:

1. General shortage of drinking water. This was easily the top ranked problem overall. Most of the local infrastructures (pipes, taps, pumps,

tanks, etc.) that supply drinking water to each community have not been upgraded in decades. So, not only were there more people to serve as time passed, the infrastructure was dilapidated. Water points were also poorly managed by the communities. Shortages of drinking water reportedly have very negative implications for human health, hygiene, and general welfare. While a declining water supply could be most attributable to population growth, poverty, and lack of development investment, climate change may be contributing in terms of slowly drying the landscape.

Solutions: Focus on obtaining donor funding and technical support to rehabilitate infrastructure for water development in each community. The cost to make significant improvements in these systems, however, is not small.

2. Decline in crop productivity on non-irrigated terraces, and the consequences for household food security. Crop yields for wheat, barley, millet, and maize were perceived to be declining due to the irregular rainfall, poor management of soil fertility, and traditional reliance on crop varieties that are not well-suited for the observed changes in climate. In contrast to drinking water, this set of problems was more directly traceable to the impacts of climate change.

Solutions: Farmers, first and foremost, wanted irrigation technology to stabilize crop yields on the terraces. However, this is a very difficult and expensive need to fulfill. It is more likely that the implementable interventions will include technical advice on drought-tolerant crop varieties, tillage practices to better conserve soil moisture, and improved soil-fertility management practices (including compost management). These changes will help to adapt cultivation methods to warmer and drier growing conditions. The big challenge is how to get timely and pertinent information or new technologies to farmers given limitations in regional extension services.

3. Lack of off-farm income sources. There are very few sources of cash income for farming households across all four of the communities, and people's income- generating skills are also limited. Local opportunities are needed to generate off-farm income to reduce the need for younger family members to go abroad under risky circumstances to find work. This problem is related to the inability of most farms to provide enough food for their household members. This, in turn, is due to small acreages with respect to a growing human population. Lack of local markets also plays a role, as does the general poverty that limits demand for various goods and services. Climate change is less relevant for this problem, although it is known that increasing incomes can reduce poverty, and reducing poverty can reduce human vulnerability to climate-change perturbations.

PRA session. (Photo credit: Divakar Duwal)

Solutions: Appropriately targeted job-skills and micro-enterprise development. Prominent training suggestions included bee keeping, vegetable and fruit farming, herb production, post-harvest vegetable production, soap-making, leather work, carpentry, masonry, electrician training, driver education, shoe making, and Nepali paper-making.

4. Better comercialization of household animal production and improve animal husbandry. A general lack of awareness concerning proper animal husbandry was evident when this priority was discussed. Lack of information, rigid and suboptimal traditional management practices, and lack of entrepreneurial skills probably contribute most to this problem. Climate change may be acting indirectly on household incomes and poverty by decreasing productivity of locally available fodder. Less fodder means lower animal productivity, and hence fewer economic benefits for people.

Solutions: Expand opportunities for marketing goats for meat. There may be options to improve livestock management in general, with respect to improved housing and feeding.

The Way Forward: Opportunities to Intervene

The CAPs for each cluster were lengthy and detailed. The PRA process provided an impetus for people to better organize themselves in anticipation of adapting to climate change and dealing with the ever-present challenges of poverty, population growth, and underdevelopment. Because CAPs are the product of each cluster, they will be used as a foundation for community-based proposals that can be submitted to government agencies and other donors. Our research design will compare the outcomes of human welfare in the four PRA communities that received interventions with that of the four paired control communities lacking interventions. Data collection will focus on assessments involving household surveys and focus groups. The use of PRA complicates the research process since the PRA team needs to follow through on intervention promises as part of a "compact of trust" with the communities. There is always uncertainty in soliciting for donor support, and this adds complexity to the process.

At this writing, the most plausible and cost-effective interventions include building human and social capital via education and human organization, respectively. Such processes can help communities: (1) Better manage drinking water and rain-fed cereal production; (2) stimulate micro-enterprise development via collective action and micro-finance; and (3) facilitate information dissemination, especially with respect to adapting cultivation practices and engaging with goat markets. More ambitious interventions are dependent on securing additional donor funding, and the reality is that resources to assist poor, rural communities to adapt to climate change and mitigate poverty will be very limited. Understanding the minimum investments needed to achieve any positive impact is therefore important in order to produce real and lasting change in this region.

Further Reading

Anonymous. 2013. Improving Resilience in Mixed Farming Systems to Pending Climate Change in Far Western Nepal: Participatory Rural Appraisal Report. Helen Keller International, Kathmandu, Nepal. 96 pp.

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Improving the Resilience of Mixed Farm Systems to Pending Climate Change in Far Western Nepal

Principal Investigator: Robert Gillies, Utah State University

We propose a transdisciplinary research program on adapting livestock systems and community organizations to climate change in the Far Western hill and terrai regions of Nepal. Partnerships between Utah State University, the Government of Nepal – Ministry of Agriculture and Cooperatives, the U.N. World Food Program (UNWFP) and Helen Keller International (HKI) in Nepal will link our climate assessments with data on food security, agriculture, and markets in all districts of the Far Western regions. Our major objectives are to: (1) Analyze patterns of climate change with a focus on prediction of future droughts and floods caused by changing patterns of monsoonal and winter rains; (2) Analyze evels of food insecurity and malnutrition and coping strategies used in response to the 2008-2009 drought in all districts in the Far Western regions; (3) conduct community-based participatory rural appraisals (PRAs) in sample communities that include women-led Village Model Farms (VMFs) established by HKI and determined to be at high risk for future drought and food insecurity in order to elucidate innovative local risk-management strategies to adapt livestock systems and community organizations; (4) extend our capacity building efforts in microclimate monitoring and agricultural extension activities in high-risk VMFs; (5) evaluate the outcomes of the PRAs and community based action plans by comparing the levels of knowledge of weather, agricultural changes induced by climate change, food security indicators, and action plans for resilience in the intervention communities versus comparison communities without PRAs or VMFs by applying case-control epidemiologic study design and statistical analyses.

Feed the Future Innovation Lab for Collaborative Research on Adapting Livestock Systems to Climate Change is dedicated to catalyzing and coordinating research that improves the livelihoods of livestock producers affected by climate change by reducing vulnerability and increasing adaptive capacity.

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