Targeted Informal Education Promotes Improved Well-Being, Innovation, and Climate-Change Adaptation among Residents 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

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Abstract

Western Nepal is a remote region that is home to a wide variety of traditional 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 negatively affect crop and livestock productivity. Here we report findings from a novel, quasi-experimental approach where the residents of two communities were provided with an intervention package and their perceptions of change over a 16-month period were contrasted with those from residents of two paired "control" communities that lacked the interventions. The goal was to assess the impact of interventions in promoting well-being, agricultural innovation, and climate-change adaptation. Research efforts included baseline surveys conducted in December, 2013, as well as endline surveys conducted during May, 2015. During the interim period a series of informal, educational inputs and technical demonstrations was implemented based on needs assessments from Participatory Rural Appraisals and expert input. Results indicated that the educational interventions had a very positive impact on nearly all of the 24 attributes that were assessed. The implications are that a concentrated and relatively low-cost educational effort—based on community felt needs—can enhance well-being, innovation, and adaptive capacity of the rural poor in a relatively short period of time.

Background

In a previous research brief (see "Further Reading") we described the livelihoods and priority problems faced by communities in Bajura District, a 2,188-km^2 region in far western Nepal. The district is home to about 137,000 people and the population is dominated by small-holders who produce cereal crops (i.e., wheat, millet, rice) and a few livestock (i.e., goats, bovines) under difficult conditions. Poverty is the norm and residents are isolated from the outside world. Bajura District is among the most food-insecure districts in Nepal, as on-farm production of cereal grains typically only covers household needs for up to six months each year. The district is divided into 27 Village Development Committees (VDCs). Each VDC is comprised of multiple residential clusters that include from 200 to 250 households each. Figure 1 illustrates the general environment for hillside farming.

Climate scientists on our project have previously noted that western Nepal is vulnerable to climate change given that air temperatures are projected to become warmer and annual precipitation will decrease. Our project component concerned community engagement. We wanted to conduct research to reveal interventions that could rapidly promote climate-change adaptation. In the course of our efforts we also learned that poverty alleviation was a critical issue, and in many cases poverty and climate-change problems were closely inter-related.

Figure 1. Hillside farming in Bajura District. (Photo credit: Arjun Bahadur Basnet)

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Participatory Rural Appraisal

We began by using Participatory Rural Appraisal (PRA) in May and June, 2013, to assess the felt-needs and develop community action plans (CAPs) for several community clusters that were selected based on their representativeness for Bajura District. There was an average of 60 participants for each PRA and each PRA took five days to complete (Figure 2). Details from the PRA work are reported in a previous research brief (see "Further Reading.")

The major priority problems identified by the communities in the PRAs were: (1) Shortage of drinking water; (2) decline in crop productivity on non-irrigated terraces; (3) lack of off-farm employment; and (4) need to commercialize livestock production and improve animal husbandry. Each priority problem had multiple solution-pathways. Some of the best-bet intervention concepts identified by community members and researchers included improvements to water-delivery systems, crop diversification, skill development for household members, and production and marketing of meat goats. Of the top four priority problems, the second one concerning a decline in crop productivity was most attributable to climate change. The others were more closely linked to problems of poverty, population growth, or lack of development investment.

Interestingly, community participants in the PRAs commonly observed recent changes in their natural environment that indicated warming and drying conditions. They had little understanding, however, of "global climate change" per se. This is understandable given their high degree of isolation from world news. Once the communities accepted that climate change was happening, it allowed the residents to begin to think more strategically about how to adapt their farming practices and alter other aspects of their lives.

Baseline Survey

A baseline survey was conducted in December, 2013, at the four community clusters of Jugada, Budhiganga, Attichaur, and Gudukhati using a semi-structured questionnaire. A total of 320 households were randomly selected for the survey with 80 per location. The goal was to characterize the communities in terms of their priority problems, farming practices, and socioeconomic features. We found that the communities maintained long-held traditions in crop and animal production, and consequently showed a very low degree of innovation. Limited innovation meant that adaptation to climate change could be a big challenge. We believe that these patterns occurred because they are very isolated from the outside world. More details are reported elsewhere (see "Further Reading.")

Research Design

The four communities were deemed similar enough in terms of geography, farming systems, and socioeconomic conditions to proceed with a paired research design where two communities (Jugada and Budhiganga) would receive development interventions while the other two (Attichaur and Gudukhati) would serve as comparative controls, respectively, that lacked interventions. Then, after about 16 months of intervention implementation, we would re-assess all four communities using an endline survey to measure impact. Presumably, the communities receiving interventions would show greater positive change in various aspects of climate-change adaptation, risk management, and resilience when compared to paired controls. This research design was approved by local government as well as the Institutional Review Boards in both Nepal and the USA. The residents of the control communities agreed to serve in this role with the understanding that they would receive priority for future development interventions when more resources became available.

Our project, of course, made no attempt to control access to other development inputs or access to public information in any of the four communities. The situation, however, was that such background resources were uniformly lacking. Our project was virtually the only consistent source of external assistance in the immediate area during the period of study.

Implementation of Interventions and Demonstrations

The interventions were implemented in Jugada and Budhiganga starting in January, 2014. Selection of interventions was based on several factors including: (1) Priority problems identified by residents in the PRAs and baseline surveys; (2) experience of local development agents; (3) technologies or training options readily sourced by HKI that best fit local needs; and (4) endorsement by local officials.

The final portfolio of interventions was dominated by informal education. Informal education was implemented via a "training the trainers" process as follows:

- Four voluntary community groups were formed with two in Jugada and two in Budhiganga. Each group had between 20 and 22 members, with about 65 percent women and 30 percent Dalits (e.g., members of the lowest social class) to promote gender and social equity. The main purpose of the groups was to have them help educate and coordinate their communities to encourage the adoption of best practices with regards to a suite of agricultural production issues. All group members received specialized training from HKI staff in the following topics, sometimes involving a week or more of instruction:
  - o Goat production and marketing;
  - o Water management;
  - o Processing and marketing of powder from stinging nettle (Urtica dioca), a substance locally used for medicine, food, and fiber;
  - o Production and marketing of fruit and vegetable seedlings;
  - o General livestock management (i.e., housing, feeding, health, breeding); and
  - o General crop management (i.e., seed production, composting, mulching, cultivation techniques).
- Ten people (including four women and three Dalits) were trained to be "climate-change master trainers," with five in Jugada and five in Budhiganga. They were volunteers who received specialized education from HKI staff in climate change as well as the best local practices for climate-change adaptation. These master trainers then provided one-on-one education for households in their communities.

These master trainers received a per diem and lodging during their training period but otherwise were not compensated.

• Ten people (including four women and six Dalits) were trained to be "social-mobilization master trainers," with five in Jugada and five in Budhiganga. They were hand-picked volunteers who received specialized education from HKI staff in group leadership dynamics, entrepreneurial skill development, community advocacy, and community-based savings and credit. These master-trainers also provided one-on-one education for households in their communities. These master trainers received a per diem and lodging during their training period, but otherwise were not compensated.

The technical demonstrations included:

• Roof-top, rain-water harvesting systems for homes. There were two systems supplying water for four households in Jugada and one system supplying water for 12 households in Budhiganga— storage capacity varied from 2,000 to 6,000 liters;

• Improved animal sheds, with five for households in Jugada and six for households in Budhiganga;

• Provision of apple and walnut saplings, with four pairs given to 44 households in Jugada and four pairs given to 40 households in Budhiganga;

• Provision of fodder grasses, with 115 young plants given to each of 44 households in Jugada and 115 young plants given to each of 40 households in Budhiganga; and

• Provision of a three-meter plastic tunnel for greenhouse vegetable production plus 10 grams of assorted vegetable seeds. Three households received tunnels in Jugada, while 44 households in Jugada and 40 households in Budhiganga received seeds.

The residents of either site who received a rain-water harvesting system or an animal shed had to provide 15 percent in matching funds for these interventions, and they also provided free labor to assist with installation. The rain-water harvesting systems, on average, cost about NPR 100,000 (or USD 948). In all other cases community beneficiaries were expected to freely provide their labor or time to the project.

There were some secondary effects of intervention that were observed during the intervention implementation period. One example is the success that Jugada and Budhiganga had in obtaining additional funds from local government in response to submission of community proposals; proposal preparation was part of the capacity-building portfolio. One grant received by Jugada was for NPR 20,000 (or USD 188) while another for Budhiganga was for NPR 24,000 (or USD 226). Funds in both cases were used to purchase improved agricultural inputs.

Table 1. Numbers of households (HH) directly engaged by trainers in the dissemination of educational interventions or technical demonstrations for two communities in Bajura District, Nepal, during 16 months in 2014 and 2015.[1]

Intervention	Jugada (no. HH directly involved)	Budhiganga (no. HH directly involved)
Climate-change awareness training	44	40
Social mobilization training	44	40
Improved animal-management training	44	40
Improved crop-management training	44	40
Collective-action group membership	44	40
Savings-and-credit group membership	44	40
Improved goat-marketing training	45	41
Use of improved animal sheds[2]	5	6
Establishment of fruit/nut trees[2]	44	50
Establishment of improved fodder grass[2]	44	40
Use of greenhouse tunnels[2]	3	0
Distribution of vegetable seeds[2]	44	40
Sale of vegetable nursery plants[2]	1	0
Processing/sale of stinging nettle powder[2]	5	1
Use of rain-water harvest systems[2]	4	12

[1]Jugada cluster has 182 households with about 1,274 residents. Budhiganga cluster has 212 households with about 1,484 residents. At the start of the intervention period in January, 2014, the two clusters had virtually no use of any of the interventions described above with the exception of savings and credit. The educational interventions reached virtually all households in each community. Nineteen to 24 percent of households in each community were directly engaged by the community groups and master trainers, while the remaining households were indirectly engaged via their neigbors who had previously benefitted from direct training experiences.

[2]These interventions were typically small-scale demonstration activities. The others were educational.

Table 2. Percentage of households (HH) agreeing with 24 attribute trends in response to capacity-building interventions and technical demonstrations in Bajura District, Nepal 2014-2015.

Attribute	Pair 1		Pair 2		Both Pairs	
	Jugada (treated, n=80)	*Attichaur (control, n=80)*	*Budhiganga (treated, n=80)*	*Gudukhati (control, n=80)*	*Treated (n= 160)*	*Controls (n=160)*
Improved HH climate-change awareness	93	14	99	5	96	9
Improved HH climate-change risk-management skills and knowledge	85	16	91	3	88	9
Improved HH ability to recover from future crisis	86	21	95	13	91	17
Improved HH ability to plan and seek information	81	20	80	8	81	14
Improved community support for problem-solving	93	74	99	79	96	76
Increased HH involvement in on-farm income generation	75	13	83	9	79	11
Increased HH involvement in off-farm income generation	83	40	43	43	63	41
Increased HH total income	78	29	93	23	85	26
Improved HH access to savings and credit	88	59	91	36	89	48
Increased HH cash savings	80	35	91	16	86	26
Improved HH income diversification	78	35	81	24	79	29
Improved HH asset diversification	44	4	30	6	37	5
Improved HH access to water	78	53	90	16	84	34
Improved management of community water points	90	71	95	30	93	51
Improved HH frequency of hand-washing	100	98	100	99	100	98
HH production trend for non-irrigated crops	53	21	65	18	59	19
HH production trend for irrigated crops	69	26	70	15	69	21
HH production trend for fruit trees	89	31	98	31	93	31
Improved HH soil management (non-irrigated)	56	19	71	9	64	14
Improved HH soil management (irrigated)	63	38	79	33	71	35
Improved HH animal husbandry	65	11	56	4	61	8
Increased HH livestock commercialization	56	9	64	3	60	6
Increased HH emphasis on livestock versus crops	84	24	64	25	74	24
Improved HH food security	59	18	75	3	67	10

By the end of the 16-month intervention period about 19 to 24 percent of the households in Jugada and Budhiganga, on-average, had been routinely exposed to capacity building or the technical demonstrations (Table 1). The remaining households were indirectly engaged by the initial project beneficiaries. The control communities were monitored and these locations remained virtually "intervention-free" during the study period.

Endline Survey

The endline survey was conducted in May, 2015, using a semi-structured questionnaire after the 16-month intervention period ended. The endline survey was conducted among the same 320 households that were surveyed in the baseline exercise.

Because the intervention period was relatively short—due to project time limits—and because obtaining accurate numerical data on actual change in system productivity or socioeconomics would be very difficult due to short-term system variability and errors in the ability of survey respondents to recall highly detailed information, we instead relied on a broader analysis of perceived livelihood and farming system trends (i.e., are situations improving, stable, or declining?) and compare results between the residents of paired communities.

Presumably, the intervention communities would show a higher frequency of respondents who perceive improving circumstances when compared to that for residents of the control communities. Such an approach was successfully used by Coppock et al. (2011, 2012) in their assessment of the effects of collective-action interventions in pastoral Ethiopia. Trend analysis is indeed a somewhat more superficial approach, but it is more likely to yield accurate results.

Findings

Here we report the frequencies of reported perceptions in the "improving or increasing" trend categories to keep things simple. Reasons that explain why improvement or increases were observed also are not shown for space considerations. We also do not show statistical results either, as those are being prepared for other publications.

The overall pattern of responses to 24 questions as shown in Table 2 clearly indicates that the educational interventions had far-reaching and positive impacts on improving the perceived circumstances for residents of Jugada and Budhiganga when compared to that for the residents of Attichaur and Gudukhati. Particularly striking were the major impacts of the interventions on: (1) Increasing climate-change awareness; (2) improving risk-management and planning skills; (3) building household resilience; (4) increasing on-farm income generation; (5) enhancing income—and especially asset—diversification; and (6) improving household access to water. Even improvements in crop production, soil management, and livestock production were perceived to a greater extent in the intervention versus the control communities; impacts on changes in livestock husbandry and livestock commercialization are especially notable (and logical) given the relatively high emphasis given to these topics by HKI. Finally, improved food security was perceived by nearly seven-times more residents in the intervention communities compared to that for the control communities.

The categories having more muted (but still positive) responses to the interventions relative to that for the controls included: (1) Improvement in community support for problem solving; (2) increased household involvement in off-farm income generation; (3) increased total household income; and (4) improved household access to savings and credit. The reason these impacts were more subdued is probably because community support for problem solving and grassroots savings and credit schemes are already part of the indigenous culture, regardless of location. For off-farm income generation, youths from many communities in Bajura District often travel abroad (usually to India) at various times of the year to work and send remittances home; this can comprise a high proportion of total household income and the process is therefore a general regional phenomenon that is less likely to be affected by community-level interventions.

Implications

The use of trend perceptions to gauge development impacts is imperfect, but so are the other research alternatives. The main challenge in relying on trend perceptions is the chance that the residents of the intervention communities have become more optimistic because of their engagement with a development project, and that the actual

Figure 2. PRA exercise in Bajura District. (Photo credit: Divakar Duwal)

degree of impact is less than what they generally believe. Observations of the HKI field staff, however, corroborate the data shown here. They witnessed many changes first-hand.

It is clear that a relatively simple, but coordinated, series of capacity-building interventions has resulted in a striking enhancement of human welfare in Jugada and Budhiganga when compared to the assessments for Attichaur and Gudukhati. It is fair to say that the core source of impact from the project was the informal education effort; the technical demonstrations were largely implemented on a small scale and would not logically contribute much to impact per se (Table 1).

Similar conclusions about the value of informal education have been reached elsewhere, namely that educational investment in the capabilities of the rural poor to better manage risk and engage in innovative productive behaviors can yield significant returns (Coppock et al. 2011, 2012). Informal education is an important tool in difficult environments where technical interventions to boost crop or livestock productivity are difficult to identify or sustain. More investigation is needed here to explore sustainable, technical options to diversify and enhance non-irrigated crop production, however, in the face of climate change.

Further Reading

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Prjoect: Improving Resilience in Mixed Farming Systems to Pending Climate Change in Far Western Nepal

Principal Investigator: Robert Gillies, Utah State University

This project is conducting a transdiciplinary research program on adapting livestock systems and community organizations to climate change in far western Nepal. Partnerships between Utah State University, Helen Keller International, the Ministry of Agriculture and Cooperatives of the Nepalese government, and other stakeholders will link our climate assessments with data on food security, agriculture, and markets. Our five major project objectives include: (1) Analyzing patterns of climate change; (2) analyzing food security issues as related to drought; (3) conducting participatory rural appraisals to assess community problems as related to climate change and poverty; (4) evaluating climate-change adaptation interventions at village and household levels; and (5) building local technical capacity in microclimate monitoring and agricultural extension.

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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