Glacial Flooding & Disaster Risk Management
Knowledge Exchange and Field Training
July 11-24, 2013 in Huaraz, Peru
HighMountains.org/workshop/peru-2013

Integrating Adaptation Plan at Local Level to Build Climate Change Resilience of Mountain People in Nepal

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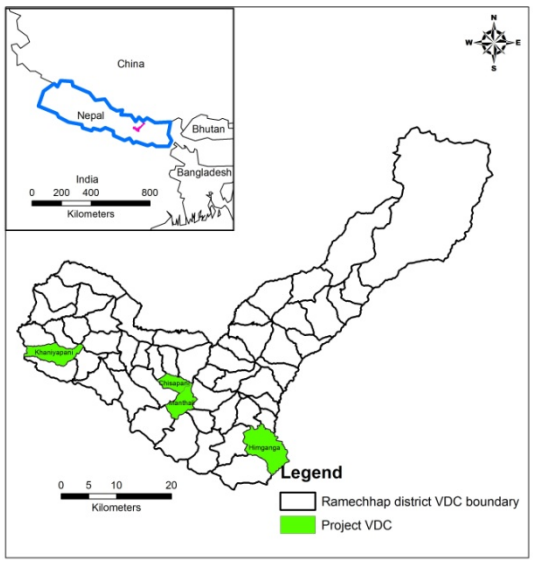
BACKGROUND

Mountain communities in Nepal cannot wait for adaptation measures as this Himalayan country is facing with impending impacts of climate change. Beautiful are their snow mountain peaks and smiles; their lives, however, have been compromising with subsistence livelihood not to damage the environment they live in. Their input to global warming is negligible 0.025% of the total GHG emission but the country is already experiencing an average maximum annual temperature increase of 0.06 degree Celsius, which is higher in the mountains than in other regions. Nepal is categorized as one of the most vulnerable countries to climate change because of several factors, including its multifaceted mountain topography, weak institutional set-up, acute poverty especially in rural areas, and low opportunities for livelihood diversification.

Under process of National Adaptation Program of Action (NAPA), Nepal has been effortful to address the problems emanating from climate change. In January 2011, Government of Nepal brought Climate Change Policy with the goal of improving livelihoods by mitigating and adapting to the adverse impacts of climate change. Nepal took initiative in drafting LAPA (Local Adaptation Plan of Action) concept which integrated climate adaptation activities into local and national development planning processes to create a situation for climate resilient development. Based on pilot activities in 80 different Village Development Committees (VDC), the lowermost administrative units, the country has prepared National Framework on LAPA. This effort, though commendable, is far from the necessity as there are over 4,000 VDCs in the country and they starkly vary in their social, economic and ecological set-ups.



A case here is from Ramechhap district, where a study is in action under Climber-Scientist grant. Ramechhap (location: $27^0$28'N-$27^0$50' N; $85^0$50'-$86^0$35' E; area: 1564.33 sq km) is a central mountainous region of Nepal with sub-tropical valleys as low as 369m asl to

nival high mountains of nearly 7,000m asl (Numbur-Chuli). The district has total population of 212,408, a sharp discrepancy exists between male and female literacy rates, with 58.3 percent for male while only 26.6 percent for female. It is home for large oranges *Junar* and lemons, but much known as a drought prone area of Nepal with its 19 VDCs in the southern belt facing severe drought despite the fact that at least two perennial rivers flow through them. NAPA has ranked it as the second most vulnerable district (vulnerability score 0.995 out of 1.000) in Nepal. Till few years ago, Ramechhap's weather data were ill represented by high precipitating Jiri, as it lacked a meteorological station of its own.

OBJECTIVES

The broad objective of the study project is to integrate adaptation plan at local level to build resilience capacity of the people to climate change. The specific objectives were:

- To assess vulnerability to climate change impacts using community based tools
- To prepare adaptation plan and integrate it in local level regular programs

METHODS

For the project activity, four VDCs, viz. Manthali, Chisapani, Himganga and Khaniyapani were selected at the suggestion of district level consultation. Manthali and Chisapani lie on the banks of Tamakoshi river which has direct connection with Tso Rolpa, a glacier lake at risk. As an entry, sensitization programs on climate change at community level were conducted in the VDCs. Community based tools, such as focus group discussions, were used to collect the information for vulnerability assessment and local adaptation plan.

Focus Group Discussion. Altogether 36 FGDs, one in each ward of each VDC were conducted. A total of 1082 people (567 male and 515 female) participated in the discussion which included women, youths, community leaders, and representatives from political parties, local organizations and teachers (Table 1). In the discussion, we used Participatory Rural Appraisal (PRA) tools such as seasonal calendar, crop calendar, historical timeline and trend analysis, resource and hazard mapping, pair-wise ranking, cause and effect analysis, institutional mapping and livelihood asset assessment.

Table1. List of Focus Group Discussion

SN	Date	VDC	Number	Participants		
				Male	Female	Total
1	3–8 March 2013	Manthali	9 (one in each ward)	197	136	333
2	10-14 March 2013	Chisapani	9 (one in each ward)	158	151	309
3	10-14 March 2013	Himganga	9 (one in each ward)	88	43	131
4	10-14 March 2013	Khaniyapani	9 (one in each ward)	124	185	309

Vulnerability Assessment. For determining the vulnerability index, the Community Based Vulnerability Assessment Tools and Methodologies suggested by GoN (2011) and MoEST (2012) were used. The three components of vulnerability: Exposure, Sensitivity and Adaptive Capacity were assessed using various indicators and ranked these indicators as per people's perception. For exposure, we used climatic activities (temperature and rainfall), hazards, livelihood activities and physiological behaviors of plants as indicators while for sensitivity, five sectors namely, agriculture and food security, forest and biodiversity, infrastructure and settlement, water and energy, and health were taken into account. We calculated adaptive capacity of local communities based on natural assets, physical assets, human assets, social assets and economic assets. Based on the information, vulnerability was calculated as follows;

$$\text{Vulnerability} = \frac{\text{Exposure (E)} \times \text{Sensitivity(S)}}{\text{Adaptive Capacity (A)}}$$

Adaptation Plan Formulation. Local adaptation plan was formulated based on vulnerability index of each community. The local people, including VDC Secretary and social mobilizers, were actively involved in the formulation of plan, while the study team facilitated it. For adaptation plan, we followed the processes mentioned in the guidelines approved by GoN (2011) and MoEST (2012).

RESULTS AND DISCUSSION

Exposure

During FGDs, present and past status of different indicators of climate as perceived by local people were noted and ranked the changes. Climatic activities included change in hot days, cold days, precipitation, snow events, storms etc. Local communities are experiencing increase in hot days, significant reduction in rainfall. Similarly, hazard trend analysis included people's perception in frequency of hazards like dry spell, landslide, flooding, forest fire etc. In all villages, local people perceived change in hazard trend in recent year. Dry period has become longer compared to past. Change in climate is detected by shift in livelihood activities especially cropping calendar. Crop cultivation time has been changed dramatically due to uncertainty of weather. Sowing and harvesting time of water sensitive crops like paddy, maize and pulses have significantly changed. According to the locals, there is alteration in plant phenology; for instance, there is early flowering in rhododendron, mango and peach.

Sensitivity

We documented the impacts of climate change in five different sectors: Agriculture and food security, Forest and biodiversity, Water and energy, Infrastructure and settlement, and Public health. The data show that climate change has the highest impact on water resources. Impacts on other sectors are on periphery of water resources (Table 2). This is mainly due to fact that the entire region is experiencing longer period of dry spells than in

past. According to local people, the agriculture production has reduced more than 80 percent and some of the traditional crops are no more in practice. Major water sources of drinking water and irrigation are drying up, creating severe scarcity of water.

Adaptive Capacity

The study focused on five different assets of communities. The overall adaptive capacities of the four VDcs are high (Table 2), though they vary to some extent. This study analyzed people's perception on different livelihood assets which allow them to tackle the climate change brought adversities. Agriculture production and availability of natural resources like forest, water, grazing land, soil, rocks etc were analyzed. Roads and other infrastructures were assessed as physical assets. Peoples' literacy, young population availability, availability of information communications were assessed as part of human assets. Similarly availability of government and non government support was assessed to analyze their perception on social security during the difficult time. The economic asset, as an important adaptive capacity, was among the lowest. Natural, physical, human and economic assets in Khaniyapani VDC are slightly less compared to other VDCs. This is mainly due to remoteness, poor physical infrastructures and less development activities compared to others. The economic assets along with other assets of Manthali, the district headquarters were higher among the studied four VDCs.

Table 2: Exposure, Sensitivity, Adaptive Capacity and Vulnerability

Components	Indicators	Chisapani	Manthali	Khaniyapani	Himganaga
Exposure*	Climate activities	3.11	3.16	3.59	3.53
	Hazard trend	3.13	3.02	3.41	2.26
	Livelihood activities	3.03	2.65	2.42	2.66
	Indicator tree	3.00	3.16	0.78	2.3
	Average	3.07	3.00	2.55	2.69
Sensitivity*	Agriculture and food security	2.30	2.26	2.59	2.59
	Forest and biodiversity	2.40	2.08	1.63	2.29
	Infrastructure and settlement	2.11	2.00	1.44	2.17
	Water and energy	3.16	3.11	2.96	2.82
	Health	2.66	2.15	2.74	2.43
	Average	2.53	2.32	2.27	2.46
Adaptation Capacity*	Natural assets	2.64	2.53	1.95	2.57
	Physical assets	2.63	2.9	1.71	2.51
	Human	2.04	2.59	1.67	2.53
	Social	2.16	2.55	3.30	2.00
	Economic	1.19	2.33	1.00	1.72
	Average	2.80	2.66	2.41	2.57
Vulnerability **		2.77	2.62	2.40	2.57

*For Exposure, sensitivity and adaptive capacity: ≥1=Low, 1-2=Medium, 2-3=High and >3=Very High
**For vulnerability: ≥1=Low, 1-2=Medium, 2-4= High and >4= Very High

Vulnerability Index

All the four VDcs presented high vulnerability index (Table 2). People are aware about recent change in climatic pattern, which is also observed in their livelihood activities. This perception has significant role in understanding the impact of changing climate in different sectors of livelihood. The impact was studied as sensitivity of the local people to changing climatic paradigm. Sensitivity was also studied under different subsectors namely agriculture and food security, forest and biodiversity, water and energy, infrastructure and settlement and public health. Though intensity across all sectors and all the sites were not similar, effect of changing climate was clearly discernible from people's perception. Interestingly effect of climate change (sensitivity) perceived by local people is not as much as that of exposure. This shows that the local people have already been practicing adaptation measures to tackle or avoid impact of changing climate. But there was lack of technical knowledge, the autonomous adaptation strategy were mere temporary based on trial and error. Hence the communities of the study area are still vulnerable to the climate change.

Adaptation Plan

Local people proposed many adaptation plans to build their resilience to climate change (Table 3). In the study area, dry spell was the major problem. People are suffering from unavailability water for drinking and irrigation. Hence, greatest number of plan expected by people was related to water resources. Water source conservation, rainwater harvesting, drip irrigation and plastic pond construction were major plans of local communities. Similarly, infrastructures like road construction, electricity were in also high priority. For agriculture sector, people were mostly interested in cash crops and drought resistant varieties of crops.

Table 3: Number of adaptation plan proposed by local communities

VDC	Number of plans					
	Agriculture & Food Security	Forest & Biodiversity	Water & Energy	Infrastructure & Settlement	Health	Cross sectoral
Manthali	5	2	20	5	2	2
Chisapani	5	2	13	10	5	-
Himganga	16	11	14	11	6	6
Khaniyapani	9	9	39	8	7	16

Conclusion

The general perception of the local community is that there is noticeable deviation in the weather condition both in temperature change and rainfall pattern. Aridity is historical problem of Ramechhap south fringe; however, the local people reported they have been experiencing increase in temperature at local level, failure of regular monsoon for last over five years with erratic rainfall pattern. While, the people's perceptions need scientific verification, the climate-related changes seem to have affected ecological systems, and subsequently, livelihood, particularly that of the farmers. Water scarcity clearly appears at the centre of climate born vulnerability at the local level. In response to these changes in ecosystems and livelihood, local communities have taken autonomous adaptation measures. An action-learning based on indigenous knowledge system and past intervention experience coupled with new technological knowledge is required, while focus has to be made on to community empowerment than working on behalf of people.

Acknowledgements

The study team at Resources Himalaya Foundation is the Climber Scientists Grantee funded by USAID Climate Change Resilient Development (CCRDCS0008). Support by USAID and High Mountain Glacial Watershed Program made it possible to present this paper at the Third High Mountain Workshop (Glacial Flooding and DRM Knowledge Exchange and Field Training; July 11-23, 2013) in Huaraz, Peru.