

Linking Climatic variability, People's perception and livelihood in Lachung Valley, North Sikkim

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Abstract: *The changing climatic phenomena have often been one of the important elements of livelihood changes among the rural communities. There has been a progressive change in the nature of livelihood of the communities that have been brought about by various factors of which the climate has been one of the most important elements of such change. However, there has been no clear cut evidences weather the changes are due to changing climatic phenomena. It in fact becomes more difficult to understand such changes on micro scale due to unavailability of reliable data. Hence it becomes important for understanding such changes through people's perception. The work basically tries to investigate the nature of livelihood changes brought about by the changing environmental conditions captured through people's perception. Besides this the work tries to understand the means of adaptations that has taken place along with the changing environmental conditions. The study is therefore exploratory in nature that tries to relate livelihood with changing biophysical conditions.*

Keywords: *rural communities, people's perception, livelihood, Biophysical conditions*

1. INTRODUCTION

The issue of climate change has always been challenged in different forums. There are two sets of views on climate change. Some believe it to be real and has been on rapid change over the years while other school of thought assumes it to be a vague, unrealistic and just a means for deriving the benefits out of it. There are different evidences and research that are being carried out to prove the nature of change that has occurred over the past hundred years.

The evidence like changing temperature, rainfall variability, seasonal changes, changing vegetation in different altitudes, changes in cropping pattern, changing species of flora and fauna in different zones of habitations etc have been used to identify the nature and scale of climate changes. Climate change is not only the threat to natural resources and livelihoods, climate induced changes to resource flows will affect the viability of livelihood unless effective measures are taken to protect and diversify them through adaptation and other strategies. Because communities are poor, their strategies for coping have to be more complex and diverse in order to withstand a dynamic and unpredictable environment (Chamber, 1997)

The nature of change has been both on micro and macro scales. The macro level changes are the changes in global temperature, changes in sea level due to rapid melting of glaciers and ice fields, and changes in distribution of general rainfall and temperature on global scale. Whatever changes that unfolds across the globe, the impacts are likely to affect the human society. The changing pattern of rainfall, temperature, and other seasonal change etc is likely to have its unequal impact both on rich and the poor population. The poorer are more to have its impact than the rich. Within the poorer section of the society, the pastoral communities are more likely to face the challenges of climate change. Institutional capacity must be strengthened in order to lessen the gaps between local and national processes and between formal and informal patterns of economic activity and resource management.

The communities dependent on agriculture and animal rearing are more vulnerable when it comes to the issue of climate change. Even the micro changes in climatic variability will have larger impact on the society dependent on animal rearing and agriculture. Even the Changes in temperature and rainfall pattern can have its cascading effects on livelihoods of the communities dependent on it. Uncertainty in the ways through which climate change will be

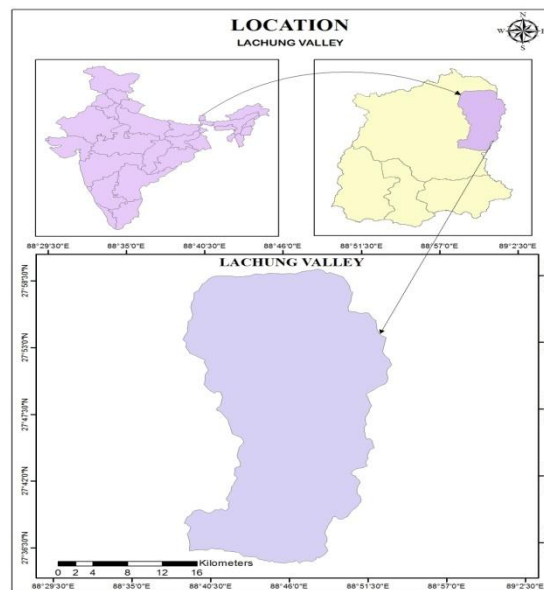
felt set against its speed and scale of impact of impact, combined with the invisibility of causal linkages in everyday life, bring new challenges for sustainability of socio-ecological system (Pelling, 2011).

The problem of food insecurity is the most important of all that may have its impact on the households that are dependent on agriculture. The loss of agricultural productivity due to alteration in seasonal pattern of rainfall and temperature can have large scale impact on household livelihood. Today already, the natural variability of rainfall and temperature are among the main factors behind the variability in agricultural production, which in turn is one of the main factor behind food insecurity (Deitz, A.J, 2006)

The livelihoods of the poorer households are more dependent agriculture and animal rearing which forms the only source of income for most of the households in rural communities. Such changes brought about by the changing climate may affect the household to greater degree of vulnerability. Hence understanding the change prior to the larger impact of the phenomena and taking initiatives to adapt to the changing climatic phenomena can be the best ways to reduce the impacts of climate change. Hence knowing the changes from people's perception has been important indicator for understanding the changes and knowing the effect of climate change.

2. ABOUT THE STUDY AREA

Lachung valley lies in the North eastern part of Sikkim. It has a total geographical area of about 750sq km. and has the altitude ranging between 1500 metres in the south to 5000 metres towards the north. The habitable zone of the valley lies between 2000 to 2700 metres towards the central part of the valley map. The zones above 4000 metre becomes inhabitable due to unfavourable weather conditions and below 2000 to 1500 metres have undulating terrain thereby making only about 40 percent of the valley area suitable for human habitation. Thus the study is based on the changing nature of mountain economy brought about by the changes in general climatic phenomena.



The nature being the dominant factor in governing the livelihood needs has to be understood closely and means of adaptations needs to be well prepared as per the nature of environment. Large scale changes brought about by the human activity may not be favourable as per the need of the environment. Hence the livelihood needs to be adapted as per the environmental changes. Close monitoring of the environment therefore becomes important for fitting oneself to meet the livelihood needs.

Lachung Valley in Sikkim Himalaya has been witnessing the changes in such general pattern of temperature, rainfall, snowfall and changes in other seasonal pattern of climate over the past few decades. The changes that has unfolded in the valley has been affecting the livelihoods of the people through decreased dependency on agriculture and shift towards non agricultural activity, Besides, this the observed changes has been towards nature and composition of animal rearing. Such changes have largely influenced the household's ability to meet their needs.

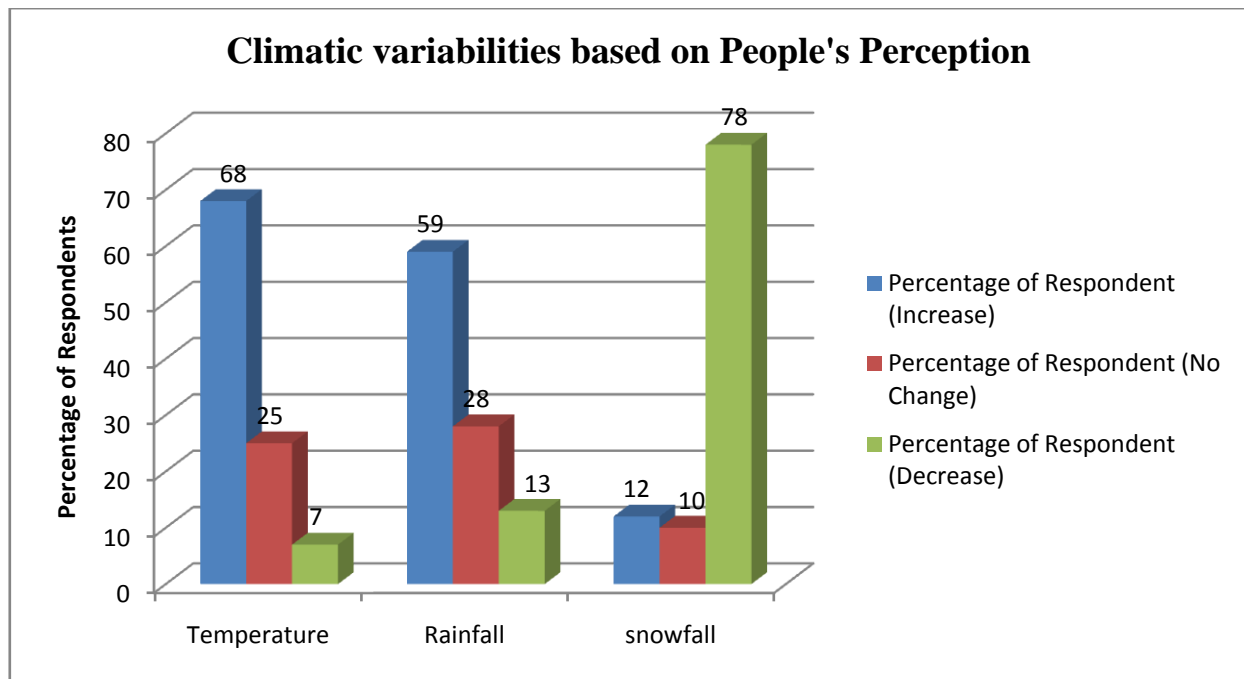
3. OBJECTIVES

- a) To understand the livelihood of the mountain community in relation to the climatic variability.
- b) To analyse the nature of livelihood changes as observed through people's perception on climate change.

4. METHODOLOGY

The work is basically exploratory in nature that tries to link the variables like livelihood, climatic phenomena and people's perception about the changing climatic phenomena over the past 30 years. The work makes use of primary data collected from the household survey in Lachung Valley. Total of 70 respondents were interviewed and their perception on climate change were shown and the effect of the same were linked with the livelihood changes in the study area. The work therefore tries to examine the livelihood changes of the community in mountain environment making primary data as the source of the study.

Figure 1: Understanding the change through people's perception



The diagram reflects the climatic variability based on people's perception over the past 30 years in Lachung Valley. The percentage respondents have been shown in the figure based on their past experiences of varying temperature, rainfall and snowfall in the study area. The total of 70 respondents was taken into consideration to understand their past experiences of climate change. Three categories of respondents have been identified in the work i.e., percentage increase, percentage decrease and percentage supporting no change.

Based on the data collected, it was found that the population supporting increase in the temperature in the valley was the highest. The categories of population supporting increase in the temperature over the past 30 years in the valley have been the highest followed by 25 percent supporting no change in the temperature over the years except for only 7 percent of the population supporting the decrease in temperature. Thus the overall analysis of the temperature change in the valley can be said to have been increasing with majority of 68 percent of the respondent having the view of increase in temperature over the past 30 years in the valley. Besides this the increase in temperature of the region over the past 30 years had been understood from the nature of agricultural productivity in the valley.

The farmers were of the view that the duration of ripening buckwheat had been lesser in comparison to the time taken in the past which itself was the indication for the rising temperature in the valley. Besides this the crops like squash that used to be found in the lower altitude in higher temperature region of the valley are being available in

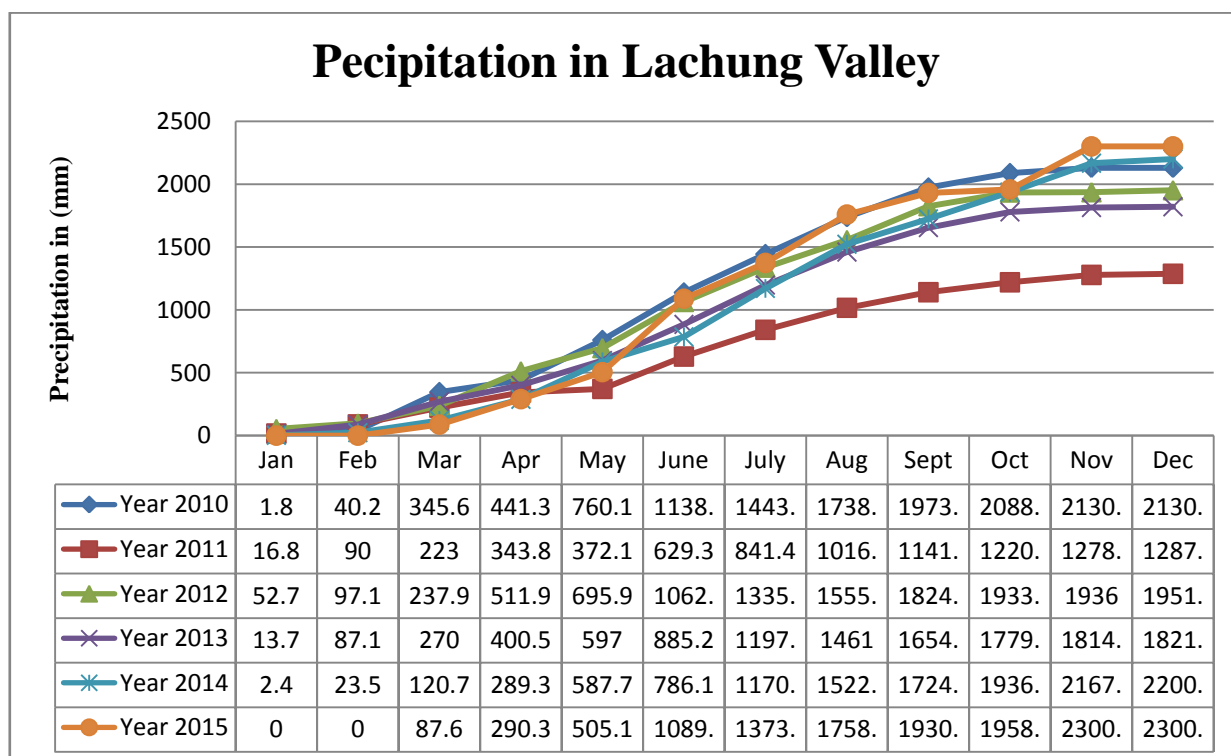
Lachung these days. Hence understanding the type of crops that have started adapting in the valley itself is the indication of rising temperature.

The other indication of climate change in the valley has been captured through the Changing rainfall pattern in the valley over the past 30 years. Majority of the respondents are of the view that there has been increased rainfall both in terms of frequency and amount. The changing amount of rainfall is compared with that of nature of landslides that have taken place in the region over the past 30 years. The intensity of rainfall has been very high and majority of the respondents believes rising temperature and increased rainfall have brought about major changes in their livelihood decisions as well.

28 percent of the respondent believes that there has been no change in the rainfall pattern in the valley over the past 30 years whereas 59 percent of the agricultural farmers are of the view that there has been increased rainfall in the valley. Thus the section of people dependent on agriculture for their daily needs are well aware of the changing rainfall as their livelihood needs are entirely dependent on seasonal variability and prepare their livelihood schedule and adjust their cropping seasons accordingly.

The other indication of changing climate in the valley has been reflected through amount and intensity of snowfall in the valley. The data reveals the fact that the amount of snowfall in the valley has drastically reduced over the past 30 years. 78 percent of the respondent shared their experiences on the nature of snowfall that they had witnessed in the valley over the past 30 years. The respondents were of the view that the month of December and January used to be covered with snowfall up to 2 feet in the valley. The region experienced the snowfall till the lower part of the valley including their agricultural fields towards Khedum, Lema and Luten. However the present amount of snowfall has been as such that hardly inches are seen on the ground level which melts within an hour and does not even occur for a week. Such has been the nature of snowfall that the Lachung valley has been witnessing over the past 30 years.

Figure 2: Varying degree of precipitation in Lachung Valley:



Source: Central Water Commission Department (CWC), Lachung

The table above shows the data on varying rainfall in Lachung Valley over the past 5 years. The nature of variability of rainfall in the region has been as such that the year 2013, 2014 and 2015 had witnesses good amount of rainfall

especially during the winter months. Besides this the valley experiences the highest rainfall after the month of July till December. Within the period of analysis it is interesting to note that the average annual rainfall has been constantly increasing over the past few years in comparison to the rainfall that the valley had experienced in the year 2010. Thus there exists a positive relation in the nature of perception about the rainfall that the respondents gave during their interviews.

Changing climatic phenomena has altered some of the household livelihood in different ways. The entire valley dependent on more of agriculture and animal rearing today rely more on non agricultural activities. The tourism boom has been on rise in Lachung over the past few decades. The mode of adaptations of the community has thus shifted from their traditional agro based to service based. People believe that the nature of climatic variability has also been one of the important determinants of livelihood changes in Lachung today. Hence understanding the dynamics of livelihood change and its sustainability needs serious attention both at the community level as well as by the policy makers.

Thus the nature of changing climatic phenomena that has been captured through people's perception through changing temperature, rainfall and snowfall in the valley had been very important in understanding the livelihood changes of the population. Such changes in natural climatic phenomena had been bringing about slow changes in the livelihood system of the population. The nature of economy has also altered from traditional agricultural activities to tourism based activities. Changing interest of the farming households with such changes in general climatic phenomena needs serious attention especially among the mountain communities. Large scale alteration in the nature of economy may not favour the region when it comes to the need for adaptability.

5. CONCLUSION

Livelihood research needs close analysis of different factors like people's choices, socio economic conditions of the people and different other factors of which changing climatic scenario has been the most important one. Households changing decisions are very important when it comes to the issue of sustenance. Rapid change in the livelihood decision processes needs close understanding of the causal factors and sustainability of such livelihood needs close monitoring of phenomena like the role of institutions, policy makers and rural communities. Participation of the households in managing the resources and sharing of ideas and mutual cooperation among them is the way forward to tackle the problem of unforeseen consequences.

Hence the livelihood of the mountain community today is more dependent on non-farm activities. There has been a significant shift in their pattern of livelihood. The dependency on market based products has increased and their traditional modes of sustenance have greatly been influenced by the market forces. The agricultural practices of the mountain communities have significantly altered over the past few decades. The climate has been one of the several factors that act as a catalyst of change. Hence knowing the degree of climatic variability becomes an essential in understanding the livelihood processes of mountain communities. The nature of adaptability of the population can thus be monitored by the institutions. The findings suggest that the people's perception has proved to be the essential tool of analysis for understanding the climatic variability and the changes in the nature of livelihood in the valley. There has been a remarkable shift in the nature of livelihood brought about by the changing climate. The mountain communities today need greater degree of cooperation with the institutions so as to reduce livelihood vulnerability and attain greater degree of sustainability.

REFERENCES

- [1] Khan, S. R (2012) "*Linking Conservation with Sustainable Mountain Livelihood: A case study of Northern Pakistan*" Faculty of Graduate Studies, The University of Manitoba
- [2] Scoones, I. "*Sustainable Rural Livelihoods: A framework for analysis*" IDS working paper 72
- [3] Reddy R.V, (1995) '*Environment and sustainable agricultural development: conflicts and contradiction*' *Economic and political weekly*, vol.23, No. 12
- [4] Ives D.J, (2004) *Himalayan Perception: Environmental Change and the well-being of mountain peoples*, Routledge Publication, New York

- [5] Ellis, F. "Rural Livelihoods and Diversity in Developing Countries." Oxford University Press, Oxford, 2000.
- [6] Pelling M, (2011) *Adaptation to climate Change: From Resilience to Transformation*, Routledge Publication, Oxon