

PEOPLE'S PERCEPTION AND KNOWLEDGE ON CLIMATE CHANGE:

An Anthropological Examination of Climate Change on Forestry

Chapter I

1. Introduction

1.1 Background of Study

Anthropologists have been discussing over the issue of climate change from 1990s and believe that anthropology without a sense of urgency about global warming is unthinkable (Batterbury 2008 pp.62-68). They are more sensitive and devoted to address the global warming from the local aspect based on local experiences and knowledge for rural adaptive strategies. In this context, an anthropological monograph provides insights to our present climate crisis (Crate and Nuttal 2009). Local people have experienced and observed the climatic complexities from general perspectives where the vulnerability of community concerned much. It succeeds to concentrate all the (Academicians, Politicians, Researcher, Scientists and so on...) in 'Climate Change' which is spreading over the public sphere at present. Climate change is reality in local and global level undergoing changes with social and cultural events uncertainty. This issue is only summed up by anthropology, as moral, social and cultural issues with the realities of local level.

The study site Lamatar is a hill and plain area situated in the southern part of Kathmandu valley. This area is only spreading over and over in height and closely attached with Churia range with varied topographic condition in southern part. It always depends on the climatic condition of Himalaya range because of its height. It directly strikes over this area and balances the appropriate climate for local species that are existing inside the forestry. Such plants, animals, insects and other many natural have contributed for the balances of local ecological setting. Local people have

an affair with climate and natural resources in its importance that is varied in quantity and quality in different time period. Local resources are valuable instrument for rural livelihood in their traditional activity which they follow in seasonal period. The Churia range is densely covered from various forest species consisting on variation in climatic condition. Local people have uncertainty of climate in local level rather than the global level of forestry. There are various plants and species reserving according to the topographic condition changing time to time in amount. Local assemblages of plants have been establishing and old one is diminishing inside the forest. The appearance and disappearance of new assemblages in forest are altogether vulnerable.

The perception and observation of people based on the ground truth and realities helps to verify the extent of climate change, identifies locally important factors of change, and offers insight into the experiences of living under changing conditions (Shaffer and Naiene 2011). Always the realities are lying in the forehead of rural people in the varied geological area. According to the resources and topographic condition rural communities are living differently in varying ecological area. They are following the traditional calendar to sustain and compromise the abilities of individuals over a time. Each and every community has different living strategies and follows the different idea to sustain in their physical world. The ethnic community (Tamang) claims that the living place is his ancestors and the Churia area is grazing place of livestock. They are living in the top of Lamatar from long time ago but the rest of the communities are living here for sometimes. Local people have varied perception and knowledge of their surroundings according to the geophysical condition. They are interacting with local environment by rural adaptive and coping strategies. Rural people have opportunities to sustain their life depending on forest resources because of its availability. It contributes positively in the life ways of people based on the resources of this physical

world. The knowledge and experiences are under the circumstances of climatic conditions based on relationship of their local activities. The climate is appropriate for local livelihood strategies of people but now it is obscuring for all. There are various communities living across the Churia range having an idea and knowledge on climate phenomena. The unevenly occurring climate has brought variation in local vegetation pattern with some sorts of characteristics. The availability of local resources and other species are uncertain.

1.2 Statement of the problem

Climate change could have significant negative and positive impacts on existing forests resources in rural area. This could occur where climate change caused precipitation to decline (Sedigo and Sohngen 1998). The world's current debate and action on climate change primarily focus on the mitigation strategy by reducing the emission of the green house gases (UNFCC Kyoto Protocol) as compared to human adaptation and social vulnerability. Local communities are different in the way they perceive risk and utilize the adaption strategies for mitigating negative change (Create and Nuttall 2009). According to the geophysical, local environment condition and community tradition maintains the local strategies and practices of people.

The total climatic problem associated with the increasing global temperature, glacial retreats, glacial outbursts, floods, droughts, erratic rainfall, landslides, water resources are the vibrant troubles and different disease in the rural area which are triggering serious environmental and societal disruptions in spite of its least contribution to green house gas emissions (Dash, 2007). Nepal having a great variation on environment indicates the diversified area according to the topography. Local people perceive the idea through their sense where they use to act and response on the basis of climate event. Local culture and their cognition determines what constitutes risky climate

change and flexibility will specify limit to the adaptation beyond which community response are no longer able to maintain acceptable, social, cultural, and economic goal (Create and Nuttal 2009).

Local people are interacting with local environment of the given region and respond to it appropriately for their life ways. The climatic condition from past to present is the main theme where the climatic hazards becoming serious problem to the rural forest resources and local livelihood. The behavior of plants, plants species, species and local calamities are under the way of suffering and it gradual in differing time period. Again the productive land and natural resources are encountering challenge of climate uncertainty in their living world. The climatic condition and natural resources are falling in risk in local area due to unstable climate. Rural people act and follow the traditional idea and knowledge for their subsistence life ways. It brings challenges in natural harmony and added uncertainty vegetation pattern. People are facing rapid climate fluctuation and local vegetation pattern at present but it was supposed to be regular in past. These types of challenges have been encountered by people at the local level which they analysis and interpret on the basis of their interactive role.

The vegetation pattern is facing challenges over a year due to the uncertain climate and weather fluctuation. It has major contribution on growth and reservation of forest species. Local forest and long/short climate plays vital role of local ecological setting with its viability. The traditional knowledge, skills and their living strategies has been tackling seriously than the past. Those rural people are keen observer of social event in their life time so they first know from their local activities. This climatic condition not only concerned to flood and temperature of certain area but also create curiosity to the forest resources which has been affecting seriously in local level. The vegetation patterns were shaped according to the seasonality and contribute positively on

ecosystem but now it has been destroying the balance and emerging as new problem. These types of problem regularly meet the rural livelihood and disturb the local ecological setting of rural area. The way the cultural values associated with forests and others are now thinning unknowingly from there. The behaviors characteristics of forest (blooming, flowering, growing and migrating) and its availability is reshaping regularly. The particular place and behavior of local forest has supposed to be changing with uncertain climate calendar. People used to predict and analyze the climate on the basis of their knowledge and experiences that is reflected in behavioral characteristics of local forest but now such knowledge and experiences are turning as fallacy due to the uncertainty climate. Their local culture and calendar is also shifting with local climatic condition. Rural people are coping and living strategies is also a crucial study through people's emic perspective participating within community system. People's perception, knowledge and experience are documented during the research period and pointed out the answer of these questions.

1. How the perception and climate data are relevant and varied in physical world?
2. How the Knowledge and experiences of people are embedded in climate reality?
3. What sorts of changes are going on in climate and forest resources of Lamatar?

1.3 Objectives

The general objective of this study belongs to perception and knowledge on climate change addressing the changes on forestry.

The Specific objectives are as follows.

-) To examine the people's perception on climate change, its relevancy in climate data along with local forest.
-) To document knowledge and experiences of past and ongoing climatic variability that people have during their life time based on local understanding.

1.4 Rationale of the Study

Nepal is no longer remaining alone in this climate change effects. All the sectors have been changing and facing challenges rapidly over a time period. People's livelihood, forest resources, agriculture, health and could have serious consequences for Nepal. This study has concentrated on climate changes issues including local forestry of Lamatar. Forest and climate are interlinked evenly in given area which have been affecting vigorously with uncertainties. The information is lacking currently on it. They used to predict the weather forecasts assuming the previous climatic condition but now turn into fallacy. Local people are serious about shifting and changing nature of climate throughout their life.

Most of the analyses looking at forestry have concentrated of the mitigation possibilities of carbon sequestration and greenhouse gas emission from scientific valuation. But the local affect of climate change on forestry in anthropology disciplines is rare in Nepal. So that it is necessary to study about the climate change on forestry. The forest is more viable instrument for rural livelihood and it is more vulnerable among other resources. Nepal's overall temperature has been increasing at the alarming rate including Himalayan and non Himalayan region. Local people are facing the similar development challenges to meet their demands from forestry. This indicates that the impacts of climate change on forestry resources are serious and common concern for all disciplinary people.

This research is valuable for the same latitudinal area, academicians, researcher and interested person in one hand and the on the other hand it helps to policy formation of a country. Besides this, rural people and their community are facing challenges of climate regularly and living with uncertain future will get information about it.

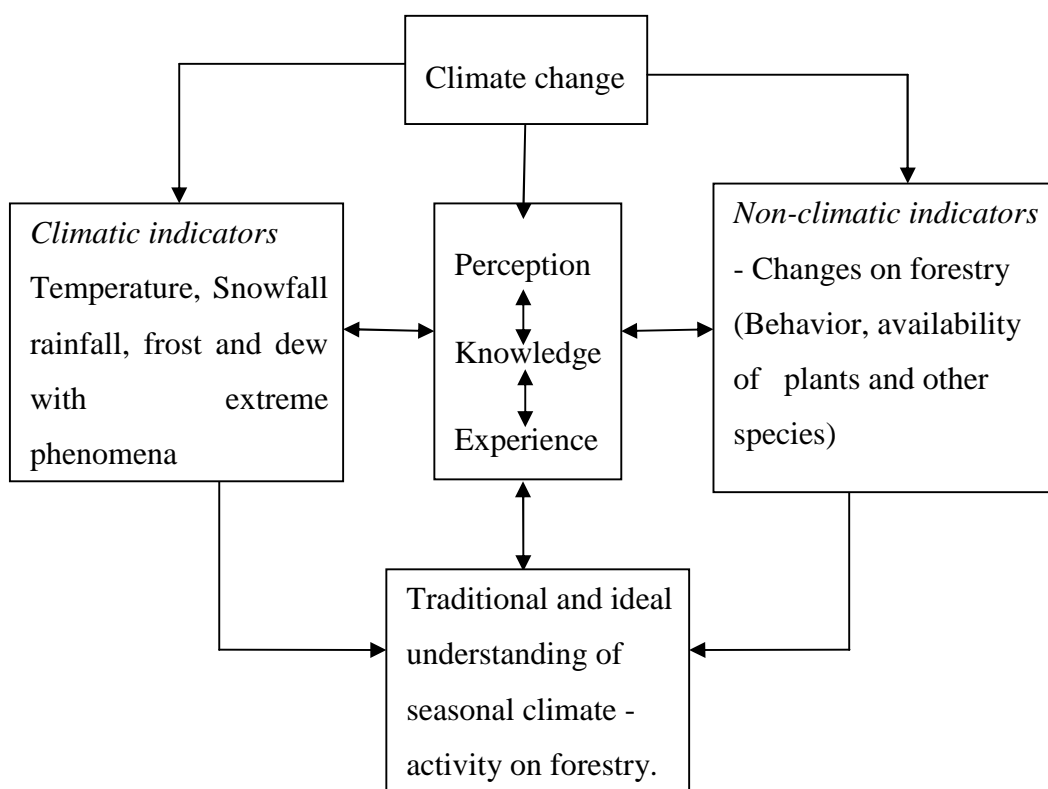
Local people use to predict and analysis the local climate on the basis of their local knowledge and perception. Lamatar was very suitable for the people, vegetation pattern, livestock and living creature but at present is going uncertain. This is an issue of analysis. It is explored under the method of anthropology focusing on the historical analysis of that area including climate uncertainties. The detail information of different community is studied under the adaptive strategies. The climatic perturbation is changing by creating problems in local livelihood and effects on local understanding. They manage local strategies with traditional culture and response the local life style. The cultural treatment of weather and climate and its historical implications are found by focusing on forest resources. It is recorded under the climate knowledge and experiences of people. It is the matter of people and power, ethics and morals, environmental costs and justice and cultural and spiritual survival (Create and Nuttal 2009). The subject matter is linked from past to present by theoretical perspective in the changing context of climate.

1.5 Conceptual framework

The ground reality of climate is examined through the emic perspective where knowledge and experiences are prevailing under the social belief. This truth is situating with local phenomena of climate relating to forest and rural livelihood. People have knowledge and experiences on climatic and non-climatic phenomena with local culture. They have varied ideas and understanding of local climate event. Rural people act and believe on their real world with local climatic condition. They follow the rule and regulation local culture through which they perceive the cultural system in their local world. They can analyze and interpret the climatic condition and circumstances with rural people experiences and knowledge. People act and respond the actual event according to the social implication of it. The behavior significance

and local vegetation including forest creatures has been depending on climatic condition. Local people observe and interact in local forest daily of their physical world. Rural lives are mostly relying on forest resources from which they acknowledge the changes in their life. People's perception, knowledge and experiences are connected thoroughly with climatic and non climatic indicator by Cognized model.

Fig.1, Conceptual Framework of the Study



The conceptual framework signifies the local belief system in the physical ground with cultural attitudes. The figure mainly indicates the climatic condition and its effects on existing natural resource. The natural resource is depending on the climatic condition of the given region. Climatic and non climatic indicators are reflecting the uncertainties of climate. Local culture is interconnected with existing resources and

responding it strategically. So people perceive the climate change according to the physical conditions though their life.

1.6 Outline of the Study

The study begins with a brief introduction of the research problems and the objectives. The second chapter attempts to formulate a theoretical framework for the study through relevant literature review in relation to people, climate and forest. It contextualizes the climate knowledge of the local people and that views the perception of local people as an adaptive processes and strategies grounded in cultural values and attitudes.

As revealed in the existing literature on climate change based on the epistemologies, which views the people's knowledge systems. In this chapter, it is argued that as the knowledge systems it is a value based, social and human activity, the relationship between the past and present is justified and sustained. It is stressed that the objectives of analyzing knowledge and perception should be finding a great voice of the local forest user group as well as community people too.

Chapters three describes the methodology adopted for the study. The procedure followed during the study is based on the assumption that participatory methods, which facilitate active participation of the local people in research, are essential to investigate people's perception, knowledge and experiences regarding the various phenomena around them as well as the necessary steps taken to improve these. The conceptual framework is discussed in this chapter and other research methods including *Interview*, *Life history*, *Focus group discussion*, and *Field observation* are described.

Chapter four outlines the profile of Lamatar with research work. It describes physical setting, its history and culture of the climate change and specific details of the

demographic and social features. In order to provide a context to the study, it conducts observations into local weather includes the aspects of climate and forest of the given region.

Chapter five examines the climate and weather is interlinked in the local concept of people and how perception and metrological data are relevant in local context. Chapter six includes the knowledge and experiences on forest and climate phenomena with adaptive style which is analyzed through the local cultural context. The local understanding of climate and weather culture examined through empirical basis of people's knowledge. It again involved the silent features of local climate and weather phenomena in which local people practices in forest with climate indication.

Chapter seven concludes with the discussion on the implication of perception knowledge and experiences of local environment. Key theme emerging from present study is further discussed in terms of their relevancy to the conceptual as well as practical aspects of the climate calendar. Further, it endeavors to forward suggestions on the strategies for climate knowledge of local people.

Chapter II

2. Literature review

2.1 Theoretical Review

Cognized model:

People from its beginning have long historical belief system in their living world. It is about climate which is not possible through surface evaluation but need local and cultural values as well. The prominent issue climate change needs the scientific, cultural and historical understanding for its proper address. In this context I have reviewed on the basis of available literature on climate change by focusing weather, climate phenomena with varied characteristics including forest resources.

Cognized models are defined as presupposed taken for granted models of the world that are widely shared by members of a society and that play an enormous role in their understanding of that world and their behavior in it (Holland and Quinn- quoted by Crate 2011). People are deeply interacted with local climatic and non climatic phenomena that are reflected in human behavior. Local belief and perception of a given area determine the complexity of climate event of their surroundings. It is important to understand both how climate change is affecting local cultural predilections and how communities can best integrate their new level of environmental into their understandings and worldviews (ibid). Cognized model is a part of human populations distinctive means of maintaining itself in its environment by the differences of this model he had analyzed it into two ways (Rappaport 1971). But for operational model is used for the description and analysis in turns meeting logical and empirical criteria of natural science. It is one of the models that he has used it for the understanding of local culture through this model. In this method he had only focused on the method of observation and measurement for analytical purpose. By using

cognitive method can dig the cultural meaning of the given environment. The traditional belief system, tradition, ritual culture, morals and other cultural methods are discovered by this model. It is again believed as the model of the environment conceived by the people who act on it (Wolf 1999). Wolf agreeing with Rappoport's cognized model and analyze the fundamental relationships of communities to the entities that they think as a part of environment. This culturally cognized models may be adaptive or humanly constructive value.

Cognitive Anthropology can facilitate effective communication of climate information that is consistent with local knowledge frameworks (Finan 2007). It studies the relation between human society and human thought of the social world. There is a unity of human experience which dictates that one should believe neither in the "radical distinction between humans and non humans... nor in the total overlap of knowledge and society. One should rather consider human experiences as building communities of "natures and societies" (Vubo 2000).

On the basis of above literature, cognized model can actually dig the meaning of climate change and helps to communicate among people's cultural relation with environment. By this method anthropology deals the climate, culture, and cognition as a whole.

2.2 Anthropological examination on climate change

Anthropology is trying to address people's perception and knowledge systems which are framed by cultural context (Roncoli et al 2009). It is one of the subjects that always reveal the problems of local people spreading over their future guided by local phenomena. This is a gradual process that people acknowledge and response in social world. People have a curiosity about the uncertain climate occurring frequently in the local ground. Anthropology to some extent tries to address the climatic hazards

through the cultural values. It presents the cultural meaning guided in the human culture from past to ongoing climatic condition. The ongoing climate has brought seriousness in rural area on the other hand it is adding complexity in rural life. So, to understand general and specific meaning of climate change on forestry should be categorized into five Parts.

2.2.1 Anthropology and Climate change

Anthropology focuses upon the holistic study of human societies, their future and in all parts of the globe; it has a unique contribution to make the study of the impact of global warming on human societies (Baer and singer 2008). It always focuses on human culture that is based on social fact happening inside the community. The local climate determined the rural life strategies of people because of their direct relation with it. Anthropology research in this area also looks at how human perception interacts with different interest groups view and understood the climate crisis (Crate 2011). A new term climate for developing countries is more crucial and vague arising decorously in public sphere. This is a long tradition of climate occurring ultimately in people's life ways with many upheavals. People live and interact in the given environment of rural area occurring with adverse affect of climate is understood by anthropology and it ideally situated to identify, analyze and address human dynamic at the core of this global environment problem (Lahsen 2007). There is a strong tradition in anthropology of analyzing systemic forms of social injustice, including the sociopolitical conditions under which the greatest burdens of ecological degradation are borne inequitably by specific groups (Baer and Singer 2009). It mainly concentrates the human culture their tradition which is scattering over the community. Rural people are facing challenges with fewer opportunities in local world. They are living in the world of uncertainties along with shifting and altering climate. The

vibrant and most voiced sound recently buzzes on human mind but they are not sufficiently enough for doing mitigation strategy. Such climatic vibrations are closely experienced by anthropologist in this area where they in turn, limited by long-standing tendencies to focus on grass root groups and local population commonly leaving the state and other macro dimensions as unexplored backdrops (Lahsen, 2007). All the micro and macro level study on climate change is only possible by local tendencies of local people. So the context of climate change with multiple subjective views concern about abstraction, generalization, replication, measurement, and quantification, with the refinement of models and the elimination of uncertainty with scientific measurement or like the anthropological concern with how climate change is apparent to local weather patterns, how rain and wind feels on one's face, how snow now feels differently underfoot than it did in one's childhood, how places no longer resemble what they did a generation or two ago, what people notice in their guardians, and how human environment relations are redefined and people are displaced allows us to shed light on the complexities of real life situations as well as the interconnections between global and local place (Crate and Nuttall 2009). Mostly the relationship of climate with human dimensions is so far cultural adaptation. The vibrant and most alarming issue in anthropology has thus far tended to focus on human societies to global warming (Bear 2008). Due to the climatic variations human societies will have to adapt to the reality of climate in various ways. Kay Milton has suggested that 'anthropology of climate change' might usefully consist of three main elements: contributions to big-picture debates, analyses of discourses of CC, and of 'realities lived on the ground ... with thoughts, feelings and strategies which may or may not engage with the global discourse' (2008:58). Anthropology is indeed well-equipped

for these tasks, but among them, it is the third that seems least likely to be addressed by the approaches of other disciplines.

Anthropology is ideally situated to identify, analyze and address dynamics at the core of global environment problem (Lahsen 2007). The behavior of human being is associated with the culture. Anthropologist from the inception culture and changing behavior are studied through the lens of cognized model. Cultural meaning that underlines peoples understanding of climate both its ordinary and abnormal manifestations (Roncoli 2006). It is embedded in people's tradition that is underlying in their life ways. Their meanings of culture are centered in the season of climate prediction where local choices are shaped by livelihood needs, goals and cultural values (Orlove 2004, Roncoli 2006). Local knowledge focused on cultural and decisions making models in which climate ideas and information are one influence on behavior (Peterson and Broad 22009). To some extent local knowledge is vital instrument in local world through which the people pursue as new strategies. The human interaction in particular area of weather guides them to their livelihood strategy. The framework of making decisions and climate cannot thus be isolated from culturally consisted ways of seeing, knowing and valuing (Vedwan and Rhodes 2001). The ultimate relation of human and environment in study surrounding with cultural diversity is also the integral part of it. So the Crate and Nuttal said, Anthropology is ultimately about culture. It joined with culture from its beginning to ongoing activities. The climate change on indigenous peoples and their traditional knowledge practicing in such different environment activity may search solution of it.

2.2.2 Interrelation between weather, climate and culture

Climate and weather are varying degree - link all scales of human activity, objects and ideas (Peterson and Broad 2009). Broadly these words signify the climatic condition in

shorter and longer time scale. The climate of a place is normally described by its varying elements, such as sunshine, temperature, moisture, winds, rainfall and snowfall like. These indicators are commonly understood in their interpretive world. Climate variability and weather patterns are a permanent backdrop of, and often a central force in social life (Batterbury 2008). It provides the sense to human and the communities which inform the human practices to connect with climate change. They try to address the changes on the basis of human environment interaction in particular region with common understanding. The classification based on weather elements such as temperature, seasonal rainfall with some certain characteristics (Dash 2007). Such elements are valuable in cultural context because they interact according to the whether/climatic conditions. Dash classified the climate, such as tropical rainy, dry, humid mesothermal (warm temperature rainy), humid micro thermal (boreal), and ice (snow) climates. Again it based on temperature differences and variations in the amount and distribution of rainfall, the above five major types of climate have many subdivisions, such as tropical rainforests, monsoonal ,savanna steppe, desert, tundra, hot summer, cool summer, summer dry, wintry dry, moist, icecaps, hot, and severe winter. Local people can analyze and predict the changes on the basis of season they have ever faced in the past. Local people's cultural attitude tries to address the forthcoming event. So weather, climate and culture are interwoven connected in the locally based environment change (Strauss 2009). Culture is shaped through the climatic conditions that they interact in their social life. Cultural frames the way people perceive, understand, experience and respond to key elements of the words which they live in (Roncoli 2009). According to the physical world people have varied idea by day to day interaction with climate world. Culture attribute meaning and value to their interpretations of weather and climate and how people have achieved and

continue their adaptation to local climate, temperature, flooding, rainfall, and extreme phenomena of climate as well are the core to contemporary investigations of climate and culture (Crate 2011). The near event related to climate has been directly observed during life time. Cultural meanings are crucial dimensions of community level understanding and responses (Roncoli and Megistro 2001).

2.2.3 People's perceptions and knowledge

Climate is always associated with particular place and region which is normally reflect through climatic and non climatic indicator. People are always aware about the local event of their surrounding either that is climatic or not but achieving it by an idea. The perception a deeper natural understanding and awareness than is usual. Their day to day interaction and observation attributes the idea to present context. Perception of climate although proximately structured by the phenomena (Vedwan 2006). They have local methods of forecasting the climate event (Rainfall, snowfall, temperature, floods, storm and so on ...). The human body's senses an important avenue through which people get to know their local weather its particular manifestation, such as rain, hail, snow, wind, and temperature (Roncoli 2006). Their avenues symbolizes significant picture in human mind that collectively dig out the social as well as cultural meaning. The way when local people inhabiting in the local community at that time they have such understanding about the events. In the period of season they arguably talked and posed their response on such local adaptive system while facing risk in day to day life. Climate organizes and shapes central aspects of our lives (Peterson and Broad 2009). The climate including average rainfall, seasonal variation, and weather anomalies such as droughts, hurricanes or floods in the daily aspect of people make them sensible in the forecasting knowledge. People's perspectives over natural hazards are by their feelings, seeing and experiencing in local level even viewing upon those natural

phenomena. On the other hand perception is treated as an exclusive property of individuals (Vedwan 2006). It is achieved by his own activity that he/she plays role in the community system. The certain environmental phenomena the process of perception is also a process of action (Ingold 1992). Some certain characteristics of environment like snowfall, rainfall, temperature and extreme weather phenomena may vary according to the local geographical setting. Perception of climate change is structured by the knowledge of crop climate interactions which is associated with changing nature of climate (Vedwan and Rodes 2001). The physical structure of any contributes local condition of climate.

From anthropological point of view, all knowledge, including scientific knowledge, is constructed and shaped according to values of validity and relevance that are accepted within community (Struckenberger 2009). That is in humans' workings and nature, through social and cultural values, practices, beliefs, language and their view on it. People having their own culture can understand the event of climate by seeing, knowing, watching and experiencing it. Climate knowledge transmitted inter-generationally across social networks but new weather patterns destabilize it (Roncoli et. al. 2009, Butterbury 2008). Most of the historical event of climate and weather shared by the community people and transmitted one to another generation. Anthropologist has begun to explore the empirical relation between local knowledge and climate phenomena (Roncoli et al 2009). There is long existing tradition about the situated phenomena where the local people are concerning highly about it. Through comparison of different systems of knowledge, people incorporate ideas from one system to another (Graca 2006). Climate phenomena are understood through the knowledge and response with cultural values. People of a particular region are rooted culturally in local level which is not addressed by scientific disciplines but it needs

cultural knowledge for its valuation. Increased productivity is expected in forests, but new pests of climate information that is consistent with local knowledge (Finan 2007).

2.3 Climate change and its global scenarios

The science of climate change tells us that global warming is dangerous and statistically inevitable (Milton 2008). The most debating and burning issue is decorous for all disciplines which are coming with uncertainty. Our uncertain future is deriving with the climate. Global warming is already...an issue that affects the Inuit on daily basis' (Batterbury 2008). To this context climate change is addressing according to its disciplines. "Global climate change is primarily a consequence of modification in the composition of the atmosphere caused by human activities" (Rajan 2005). In other term "A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere (UNFCCC 2007)".

The 4th assessment report of the inter-governmental panel on climate change (IPCC) concluded that changes in the atmosphere, oceans, glaciers, and ice caps demonstrate that the planet is warming (ICIMOD 2009). Climate change is global phenomena but one that it is locally experiencing by specific cultures and within circumscribed environment. (Strauss 2009). So it is projected on a global scale and is a global phenomenon which alerts more to contributors than non contributor. Climate change is not only relying on the face of human being but also threatening the biodiversity/ecosystem of the nature. Climate change is not only about global warming, it is also associated with changes in climate variability and changes, and the frequency and magnitude of extreme events, such as more droughts and floods (Somorin, 2010).

While over viewing the global temperature, 0.74⁰ Celsius recorded in the 20th century and scientists estimate it near to 21th century it could be 6.4⁰c in average (IPCC 2007,

Chaudhary and Aryal 2009). Climate varies naturally across all time scales. Local people are directly and indirectly attached with these three key sectors, food and fiber, land degradation and biodiversity as the most vulnerable to climate change in the South Asian region IPCC (2007). The IPCC estimates that the global temperature will most likely increased by up to 3.5^{0c} by 2100 (Oli and Shrestha 2009, p. 62). In south Asia consisting of India, Pakistan, Bangladesh, Nepal, Bhutan Sri Lanka, Maldives and Afghanistan is among the most vulnerable and high sensitive regions to the impact of climate change. It is known to be the more disaster prone region in the world supporting a huge population of more than 1.3 billion (UNEP 2003 quoted by Silori 2008). Except other, these south Asian countries including Bangladesh, Sri Lanka, Pakistan and India has major impact of sea level rise will resulting negative impact. People of south Asian countries are living in the dilemma of uncertainty which added absurdity in human and non human beings life strategies (Dash 2007). All over the world such climatic factors are contributing positive and negative in physical world. In Nepal, over the last 25 years, the temperature has been increasing at the alarming rate (0.06^{0c}) per year and high altitudes are increased by 0.6^{0c} over the last thirty years (Oli and Shrestha 2009). The natural resources like forest and water in Nepal are vulnerable. Forests are considered the second most important natural resource after water (Dhital 2009). It provides the basic needs and saves the natural environment in the local area.

2.4 Climate change in Nepalese context on forestry.

Several studies estimate that between 18.25% of the GHG emission can from forest and mostly from developing countries (IPCC 200). The most and foremost impact of climate change is appearing in that country because they have least contribution for climate change and effected most. Developing countries' South Asia is among the

most vulnerable and highly sensitive regions to the impact and consequences of climate change (Silori 2008, Dash 2007). Climate variability across the land scales of the developing country is natural. Like elsewhere Nepal is severely affected by climate change.

Forest covers nearly 40 % of total land area of the country (Chaudhary and Shrestha 2009). Climate is probably the most important determinant of vegetation patterns globally and has significant influence on the distribution, structure and ecology of forests (Nath, 2006). Disturbance intensity, frequency, and duration are likely to change with climate where the real situation at the biome level, species respond to climate change through migration, extinction or adaption to new disturbance regimes (Dale 1997). Due to the climate change vegetation of the plants vigorously appears and disappears with the capacity of adaptation. Whenever we talk about climate of south Asia then climate scenarios; temperature, reduced rainfall, drier soils, lake out bursts, higher frequency of floods and drought, crop failure, forest fires shifting patterns of resource availability are some of the major and giving risk to livelihood (Silori 2008).

Now the gradual awareness whether that is Himalayas, high Himalayas or Terai, sudden changes are occurring in plants and animal breeding shifting in rainfall, droughts etc (Chapaigain et al 2009). Local people are experiencing it through the local knowledge over a period of time. The contemporary climate of the particular area will help to govern the people to understand the climate change. Almost half of the world's forests will change due to global warming. Small changes in temperature, rainfall can have a significant effect on the quality of fruits vegetables, tea, coffee, aromatic and medicinal plants (Dash 2007). A change in vegetation would decrease the availability of grass and leaf fodder. Forests and climate change are interrelated in

number of ways. While many of these relationships are complex and poorly understood (Bonan 2008), at least four linkages are generally accepted. First, forests and forest-based livelihoods will be directly affected by climate change. Second, maintenance of forest-based ecosystem services that support other economic sectors can strengthen societies' resilience to climate change. Third, forests are already being affected by the rapid development of agro fuels, which is being driven in part by ostensibly "climate-friendly" subsidies on the part of the European Union, the United States, and other governments (IATP 2007). Fourth, deforestation and forest degradation are a significant source of the GHG emissions that drive climate change, and are among those that can be mitigated at relatively low financial cost (Seymour 2007).

Approximately 20-30 percent of plant and animal species are expected to be at risk of extinction (Sedigo and Sohngen 1998). The existing plants and other species are changing their habitat and some of them pushing near to the risk of their life. Forests thrive in a variety of climatic conditions, ranging from wet tropical forests to the forests of dry boreal (high-latitude) regions (ibid). In Nepal different types of trees grow with climatic and geographical variability. Climate of a particular place affects the characteristics of plants to a great extent. Depending on the types of vegetation, one can define climate as tropical rainforest, lighter tropical, or thorny desert forest tundra forest and broadleaf forest (Dash 2007). The average temperature of the land area defines the forest growth. In other side the forest for its ecosystem balances, where drying and warming coincidentally appear. Indigenous people are facing challenges to agriculture, forestry, livestock and water resources. So community will seek other species for production, relying on their own knowledge (<http://www.fao.org> 2010).

The Nepalese population has been affected by warming and uncertainty of monsoon (Gurung and Bhandari 2009). The uncertainty of climate is frequently appeared in Nepal and its adverse affects mostly in rural community. Local people concentrate on their local perception what they have been experiencing from past brings gap between flowering periods of male and female (Vedwan 2006). The climatic variability is responding only by the scientific disciplines in the previous time to give it scientific value but now it is spreading all over the field. Their engagement most after successful need its cultural value embedded in local world. So Anthropology in the context of cultural understanding is also right to address changes in the community. From the cultural lens, anthropology could equally dig out the meaning for all. The locally accepted knowledge, strategies, strong feelings are important in which local voice attached interestingly.

The adverse effects of climate change in Nepal is high among south Asia which is proved by the past years Tsunami, glacial lake outburst, flooding, drought even in rainy season that we are facing one after another. To this fact Nepal government has nationally initiated by formulizing the national semi-governmental office to mitigate the minimum vulnerability through NAPA, LAPA, and REED. Nepal government has established the three institutions according to the climate change policy 2067. In that policy government has paid attention on climate change effects in Nepal and formulated the action plan. By the help of this action plan Nepal government has focused the vulnerable area of this country.

NAPA (National Adaptation Plan of Action): Napa project has aimed to enable to respond strategically to the challenges and opportunities posed by climate change through the preparation of Napa document and development and development of a multi-stakeholder framework

for Napa implementation. It has three components - A. Preparation of Napa B. Development maintenance of a learning and knowledge platform to act a clearing platform of climate change C. Development of a multi-stakeholder framework of action on climate change.

LAPA (Local Adaption Plan of Action): It is a part of Napa projects. The vision of LAPA is to develop a system of adaptation planning that enables communities to understand the changing uncertain future climatic conditions and engage efficiently in the process of developing adaptation priorities. B. implement climate resilient plans that are flexible enough to respond to changing climate and vulnerability conditions C. Inform sector program and catalyze integrated approaches between sectors.

REDD (Reducing Emission from Deforestation and forest degradation): The REDD program mainly focuses on the GHG emissions resulting from degradation and forest deforestation will be significantly reduced by forest conservation and enhancement. Based on the local people who are marginalized, poor, and livelihood status of forest will be addressed by policy, regulatory and institutional structures sustainable forest resources. By its plan till 2013 will be underlined around five stages. (A) Conducting of analytical studies. (B) Consultation for strategic options prioritizations. (C) Economic and financial assessments of selected strategic options. (D.) Preparation and consolidation of the REED strategy. (E) Monitoring and evaluation.

2.5 Anthropological inquiry on climate change

They are keen observers and are trying to adapt to changing conditions (Silori 2008).

Either people are native habitants or not but the climatic uncertainty firstly suffer the rural area and their life strategies. They are encountering the changes in local level and following the coming instability of climate. Anthropology reminds us that our task is both epistemological and ontological in how we grapple with understanding what people know about the world, how they move within it, how they relate to it, how they think and feel about it, and what they say about it (Nuttal 2009). Anthropologists encounter climate change from the emic way of morality and in situation, in the field, by being in place and encountering and pondering the physical and social evidence for and effects of climate change (Crate and Nuttal 2009). The cultures of many communities are interconnected with their environment through their subsistence practices, and changes in weather and climate have far-reaching social, cultural, and economic implications (Struckenberger 2009). The questions of anthropology in particular is how to engage and or with local communities, communities in the making , decision-makers, and the broader stakeholder to satisfy the requirements arising from adhering to the principles of sustainability as boundary constraints (Puntenney 2009). Anthropologist has also contributed to understanding the development and use of climate seasonal forecasts (Roncoli 2006 quoted by Fiske 2009).

On the basis of above literature, climate change in anthropology somehow entered in 1990's than after it is raised as sensitive issue in relation to human and other beings as well. Again it tries to signify the human social dimension through cultural perception which is guided by social values and helps to cope with the environment. What local people accept in local context did not addressed properly. The uncertainty brings changes in system of local calendar which couldn't be helpful for local interaction in appropriate time and space.

Chapter III

3. Research Methods:

This chapter includes area, sources of data, area, data methods, types of data, part of analysis is described in this research and lastly the limitations of the study was mentioned.

3.1 Research Site Selection

This research is conducted in Lamatar lying in the corner of Kathmandu valley. It is diversified area having variation between the people, their living strategies, cultural practices, local lifestyles and languages too. These types of diversity are a beauty of this physical ground in one hand on the other hand it is a complexity that bears different social and cultural meaning within same community. Apart from that, the forest area is big and found various species with knowledge and experiences in different time period across this range. Moreover the community of this are belonging to the top of Churia range is ethnic and the bottom of it are with mixed group. It is easy to reach in this research area whenever I need the information of local forest and the sensitivity of climatic condition. According to the community of this area they view about climatic and non climatic condition from their own perspective in their life time. All rural livelihoods closely connected with the forest and local climate condition for following the traditional living strategies. There are different adaptive and coping strategies with varied knowledge and experience altogether.

Besides the local context it is broad to me to say about my research on climate change is only possible in support of forest action by giving me the amount for this research purpose. The area is selected for the funding intuitions and for my supervisor's suggestion.

Local people are facing uncertainty in their physical world which is not common for them. These kinds of changes are supposed up to 1980s and have been disturbing all sectors including forest of Lamatar. Climate changes are later or sooner felt in the rural forest area and other with varied forms. People have been living in high degree of environmental variability from generation to generation. The dense forest and geographical variation including climatic condition evokes curiosity for research work. Local people have specific knowledge to follow the rural strategies at present. But in ground reality people are facing uncertainty of climate during and after the seasonal timing. This is an absurdity for local people which cause positive and negative contribution in local world. From the varied causes and consequences this area is meaningful for comparing the local data with people's reality. People's perception, knowledge and experiences are compared with metrological data.

3.2 Nature or sources of data

As a student of anthropology my aim is to make meaningful study personally and have talked with local people about particular subject matter. For the anthropological study I have followed these tools and techniques: Interview, Life history, Group discussion and Field observation which are essentials for gaining the research objectives. Besides this, for its valuation some of the written books, journals, net, and library of different institutions are consulted for this research. Moreover the focus is given to the qualitative than quantitative data but for its need secondary data is also used to give the empirical meaning of the study.

3.3 Techniques of data collection

3.31. Interview: An unstructured interview has been conducted in Lamatar with 55 people. Initially, they are selected purposefully from Mathillopatlae (Lakuribhanjang), Padali, and Kafflae, including community forestry leader, member, forest guard and

user member d on age, sex, occupation, caste. Those all have a relevant expertise and knowledge about local climatic condition and forest resources. During interviews, respondents has answered the about forest, climate and climate associated environmental changes, its causes and consequences altogether. Their daily life has been passing with forest based activity, idea of knowing climate and its consequences in physical world. It has been valuable to conduct interview with them because they have knowledge and idea of knowing the climatic event as well as and it is valuable to document the voice of local people.

3.3.2 Life history: The overall event of climate is only possible from elderly people of different community which is an authentic source of historical climatic event with its cultural meaning at present. For the detail and its authenticity 21 people are consulted above the age of 60s from each community. They are selected as respondents to find out the gradual occurring climatic event their response in local seasonal calendar. They are purposefully selected from local community to know the past to ongoing condition of local climate. From them, cultural practices, climate associated environmental changes, local beliefs and traditional activities are examined deeply. The condition of forest and climate is understood from past to present by local people's life history. From the help of life history it is helpful to compare the climate event with available data of their life time.

3.3.3 Group discussion: Group discussion is conducted between the age of 25 to 72 from different community to identify the common and varied knowledge about climate and its consequences on physical world. It is discussed between the 33 people from three community forestry user group, executive committee and elderly people about the changing nature of climate and forest resources. By the help of group discussion I have analyze the different views contextually.

3.3.4 Field observation: After conversing, listening, watching, doing and sharing the climatic information with different people has inspired me for field observation; which has helped to see an overall change that local people had reported during interview, group discussion and historical analysis of the event with appropriate proof. It is done in forest and plantation area with local people of different community. It makes easy to know about the climate, its consequences with different time interval in local area. By this method I have examined the possibility of accuracy and fallacy in their views during my interaction.

4.1 Data analysis and interpretation

In this study climate change is focused in relation to forestry of Lamatar. This analysis and interpretation are performed in the field where the information gathered through different research method. The objectives of these discussions are used to document the information in a systematic form and find a way of sharing the same with a wider community including it by the villagers to raise their own level of improvement deemed necessary. The other objectives are discussed on the concepts behind local classification systems, seasonality of climate and seasonal activity of people with cultural implication.

The outcome of the discussions and recordings is also documented to preserve and share the knowledge and experience of people from elderly age to present which is analyzed on the basis of history they have really felt and experienced in their life time. The second level of analysis and documentation is done by the outside researcher in order to draw conclusions emerging from the study at different stages. The cognized model and discourses on perception, knowledge and experiences in relation to local culture are underlying behind the local communities. The themes emerging from the study on the local understanding in terms of cultural world and realities on the

behaviors and their interrelationship are analyzed. That variability of climate is explained through emic perspective. The pictures arising from those discussions are then put into the final research findings. The quantitative data obtained from the secondary source is tabulated and analyzed using computer soft word 2007 with excel program for the valuation of data and its relevancy with local perception. The available methods of data analysis in anthropology will be used as the requirements of objectives.

4.2 Limitations of the study

The limitation of the study is a way of concluding decision according to the research objectives and research problem. The study may not be result oriented and valuable if there are not any limitations. This confines the subject matter in framework and draws the research in concluding remarks. The limitations of the study should be clear and meaningful on small scale of Lamatar of Lalitpur district. There are three community forestry (Mathillopatlae, Padali and Kaflae) are selected for research purpose. It is laying in the southern part of Kathmandu in higher range. This area is focused on climate change because the climate changes effects felt earlier in rural in this area. It only concentrates on climate change, addressing the forest by anthropological lens. The forest of Lamatar is from lower to higher elevation densely scattering around Churia. Respondents are taken from different community of this area based on caste, age, sex and occupation to dig out the perception and knowledge of people during their age. From anthropological point of view qualitative data is focused primarily and secondary data is also used in its needs. Furthermore it is focused on the subject perception, knowledge and experiences of local people. It could be reference and valuable for the risk society and interested person in the field on climate change.

Chapter IV

4. Profile of the study area

4.1 Overview of the study area

Lalitpur district is situated in Bagmati zone of Central Development Regions and laying on the lap of Churae range. Lamatar is one of the VDC of Lalitpur district connected with Kathmandu valley where 41 V.D.C and sub-municipality lies. People of Lamatar are nearly nine km distant from it's headquarter. It lies approximately 27^o 25' northern to 27^o 37' in eastern. It is about 1318 to 2069 meter in height from the sea level (V.D.C. Profile 2067). The total area is 1345 from which 694.5 hector is only cultivated land 551 hectare is forest area. There are various types of community with diverse cultural attitudes. But most of the people are Brahmins and Chhetris are living in the bottom of Chria and ethnic group are in the top with many forest resources. I have only conducted Kaflae, Mathillopatlae and Padali community forestry for the research purpose. The topography of this area is up and down with much community forestry. During winter season the whole area is covered with mist and frost that creates difficulties to local people. Now the rain is recorded 293 mm during monsoon season and in winter 3.8 mm, where the relative temperature is 85 to 100 (ibid).

There are varied communities living around the forestry areas. Some are well known about the history of migration and rests of them are unknown. But Brahamins know their history and other are Tamangs who claim themselves as indigenous group are living in the top position. They (Pokheral, Poudel, and Ghimire) are major figure of these two community forestry (Padali and Kafle) and remaining one is under the dominance of ethnic group. The non ethnic group claimed the timing of migration since 1660s from Parbat and Mygdai district at the time of Laxmi Narshingh Malla.

These two community forest are given as a Birta to Poudel, Pokherel and similarly to Ghimire at 1980 B.S.

The research area is selected in central region of Nepal, Lamatar of Lalitpur district which lies in the corner and situated in the lap of Churia. The Patan of Lalitpur district is indicated by arrow where the research site is located within this area.

Fig.No.2, District map of Nepal and the research site is indicated by the arrow in the following figure.



The arrow indicates headquarter (Patan) of Lalitpur district which is a relatively nine k.m distant from this research site.

Fig. 3, The research area lies in Lamatar of Lalaitpur district southern part of



Kathmandu valley.

There are many community forestry in Lamatar but among them Lakuribhanjang, Padali and Kflae are selected because these are evenly connected towards Churia range. Most of the people have been depending on this community forestry for their needs because the forestry resources are easily found near by the community.

Population: There are 1457 households in Lamatar. The population is 7593, among them 3733 (49.16) are male and 3860 (50.84) are female. Particularly in ward no. 1, 6, and 7 has a 235 households (V.D.C. Profile 2067, V.D.C. Citizen Charter 2001). The dominant groups of this area are Chhetri (29.66), Bhramin (27.69), Tamang (15.21) and lastly the minority group is Newar and Dalit.

Ethnic and non-ethnic caste groups have been living here from generation to generation across the forest area. Minority language user groups are (Tamang and Newari) and majority are Nepali speakers. Tamang have been living on the ridge top of Lamatar's Churia hill and Dalit and non Dalit communities are living at the bottom of Churia. There are different perspectives on different phenomena with varied cultural understanding. According to the language and religion, they celebrate their cultural ceremony according to their ritual values.

4.2 Natural Resources

There are various types of natural resources available in Lamatar area. Natural resources are the primary and viable instruments for rural livelihood as well as for ecological balance. There are different kinds of natural resources like water, forest, timber, herbal, herbs and shrubs with productive and fertile land. People use the local forest resources according to their inevitability. These forests are opened over the year and people depend on it for their necessary use. They used to cut grass and graze their cattle in this forest but now it is becoming hard for doing forest activity without permission of forest user group.

4.2.1 Water Resources

The availability of water resources are adequate inside and outside the forest. In early days water sources were found everywhere even in dry season and adequate in rainy season all over the area. People used the water for irrigating vegetables; garden,

farming and livestock as well as they bring water from the canal in small amount in the past but now it is rare beside the community. The V.D.C profile mentioned the water sources were seventies or more in numbers but now it is recorded fifties around in this area. People believed that the amount and intensity of water source is decreasing rapidly one after another years. The sufficient source of water was there distributed freely in Lamatar but now it could get by turn only. People were relying on the local water resources for their traditional activities which are turning scarcity for household activities. In the early days people could easily irrigate and plant before monsoon but now they bring water through the canal. Some of them are awaiting monsoon at present for deserted land. But now the drinking water is scarcely rich at the home of local people and water resource is thinning rapidly from inside and outside the forest. People were facilitated from local resources of water but now it is hardening day by day. People used to irrigate the plain land easily before raining but the Pakho Bari only remains long for waiting monsoon. People never relying in the erratic rainfall in the past but now it is becoming hard compulsion to wait rain even for the plain land.

4.2.2 Climate and forest resources

I have conducted three community forests in ward 1, 6, and 7 of various forest species of Lamatar. These three community forestry (Padali, Mathillopatlae and Kaflae) consists 242 hectors in total. There are diverse types of plants species containing herbs and shrubs along with animal and birds according to the local climatic condition. On the basis of climate local forest species and other are appearing in different time period. Summer and winter season of this area determines the local existence of forest and other species that people closely interact while following local activities within it. These all things are viable for people and others too. According to the impotency of

forest resources they use it wisely in their needs. By their day to day observation they get knowledge on the basis of their past experiences. The small and big kinds of injuries (figure, leg, and in body) are treated at home to human or non human beings as well from the available herbal plants in the seasonal time. But now such herbal plants have been losing and thinning due to the local climatic condition.

4.2.3 Land

The Churia area is under the shelter of forest, climatic hazards and now it is becoming dry over this area. The shelter area is now changing into fertile land for growing crops. Most of the people are engaging in forest as well as agricultural activities for the adaptive strategies. This area is more productive and fertile, so that they could sustain their life easily without relying on market. They used to do more sources of water and cowshed in their local farm and it would preserve the soil productivity. Their rural livelihood is depending on forest and agriculture was sufficient in the past but now it is becoming hard. They harvest different types of plants and cereals according to the geographical structure.

4.3 Social setting

There are many communities inside this Lamatar area but among them are known as Bhramins, Chhetri, Ethnic groups and Dalits are living from long time duration. These all claim as traditional community but except the history of Tamang and Newar other are migrated from other part of the country. These two community groups have different language and other has same languages. This area is steep down to northern part with dense forest resources where Bhramins, Chhetri and Newar are living together but the Tamang are at the top of this area. The top area consisting social harmony of people and local climate but the lower belongs to diversified groups with inappropriate climate situation.

Chapter V

5. Relevance and reflections of perception

5.1 Some relevance and reflection of perception on climatic and non climatic indicator with available data of Lamatar

Rural people interact and understand the local climatic phenomena according to the significance of landscape. The topographic condition reflects the varied climatic condition that people use local time line boundary to understand their surroundings. They are aware about climate fluctuation while doing subsistence practices in their living world. People have varied perception on local level on the basis of their observation.

They observe climate event from the courtyard in one hand and the other hand they used to do their forest activity on the basis of time boundary. People perceive the local change in their life ways either in local resource or not but it is inevitable in all sectors in any forms. It hardly challenges the local traditional activity and their time line boundary of understanding is under the process of shifting. In their perspectives local environment was believed usual in early age but now it is becoming unusual losing the balance over the resources. The forest resources were well enough in the past but now it is diminishing rapidly. They reported the forest resources and water resources of this area in the past.

'Bishnumati, Manahoara, Bagmati and other local river of this area had a flow of fresh water over a year and it was drinkable while returning home from school. We used to swim in that river after the leave of school but now it seems absolutely unbelievable, disgusting and poisonous too' - Shiva Ram Poudel.

There was adequate water flow in Kathmandu valley including these rivers but now it is becoming thin and unusual together. The water sources and flow had contributed in

ecological setting and used to balance the local climate over a year. Apart from that, there were not any development activities in Lamatar and it was calm at that time but now the difficulties are occurring in local environment. People believed that the development activities has threatened the local ecological balance and brings challenges on local climate. Now local people blame that the development practice and its result causes negative impact on local environment. There were not any development activities and vehicles running in this area. But after 1960s onwards the development activities has began and gradually it loses the harmony of local climate. Than after the local environment is polluted and ruins the local ecological setting.

Perception of local people is structured by local phenomena which reflect in their daily activities (Vedwan and Rhodes 2001). Most of the people interact with forest resource according to the seasonality and vegetation pattern of local forest for rural livelihood strategies. They used to talk about the coming event of weather by looking at the sky but at present it is uncertain to assume the climate.

The rain used to begin when cloud came from east to west, where as brown color used to indicate the huge amount of rain and black indicated small drops of amounts for a while. But at present such indicators do not prevail in local calendar of people. The rain begins when cloud comes from south to east. The brown color is being uncertain where as white cloud belonging dryer with opposite moving than early time (Pahila purba bata badal auda pani Parthiyo ahilae ta dakshin bata purba pattee badal ayyo vanae pani auchha, pherri khairo badal aayo vanae pani dheri authiyo vane, ahilae kalo badal vayo vanae kam auchha, ahilae khairo badal audaina vanae seto vayo vane pani pardaina – Hari Shyam Ghimire).

The uncertainty of climate is causing problem to local forest and rural life ways. They perceive it through their sense and by real feelings of climate uncertainty in rural

livelihood. They have varied living strategies along with local adaptive strategies. It is perceived directly and indirectly from the ground reality. Moreover the Lamatar is a place of having dense forest with fertile ground. Most of the farms are under the effects of big tree and couldn't grow the crops in its actual amount. So they have sayings about it:

“The son under the loan and the crops under the tree is useless” (Rin muni ko chhora ra rukh muni ko bali kam lagdaina) - Ramesh Thapa.

The huge trees were found around community and farm area created problem in local productivity in varying season. We used to cut these tall trees during winter period for livestock but it was again in same position at the cropping season. It is gradually shifting from there and no any species of that trees reserving around there. The crops under the tree were always feeble and soft like the son under the debt.

5.1.1 Reflection of Perception on Climate Indicator/Variables

People use to understand the climate and climatic phenomena of their surrounding by close interaction and observation. Local activities and the local traditional calendar are determined by the past event of climate. To know the local calendar of rural people such climatic variables are taken as precondition in their life time. So they view upon these indicators: Snowfall, Rainfall and Temperature respectively.

Snowfall: Disturbance, intensity, frequency and duration are likely to change with climate (Dale 1997). The weather and climate of the surroundings are updating by the rural people because they follow the life strategies on the basis of climate event. The amount and intensity of climate phenomena is perceived in different time period in varying degree. It was only seen in Lakuribhanjang with some deposits during winter season which was found more or less like Himalaya whitish peaks. The snowfall was found as common entities of Lakuribhanjang over a year but now diminishing rapidly

in Padali and Kaflae that is lying across the bottom of Churia. In this context, “Crate 2008 and Vedwan 2006” indicates two ideas as below.

Changes in snowfall intensity: The ethnic community of Lakuribhanjang has memorized the snowfall events from early age (14/15) to ongoing situation of their surroundings. More often it might be before of their age but they were not conform about the event. There was not thick snowfall as like Himalaya but it was most among the other place scattering around the courtyard and forest during winter season. In this area the farming system was not like plain but some kinds of crops were destroyed and hard to get in actual amount. Some local kinds of crops were useless due to the regular snowfall. These seasonal crops were under the snowfall event. The snow had added severity in life strategies of people. They used to warm up the finger at the time of workings while collecting the seasonal of crops from the field. This area had been suffered more in winter season than summer. Definitely they feel easy everywhere in winter season along with summer. The lower area has not been suffered much in comparison to higher landscape by uncertainties.

“In my own eye, I had never cropped wheat and paddy in Lakuribhanjang area but maize, mustard yard, soybean and ... so on were the major crops. Now we are trying for wheat plantation at winter because the shelter area is becoming dryer with sun rays. Next year I will prepare for cropping crops in that shelter area which was out of sun rays and couldn't hope of production in the past. Even in chaitra (April) and Baisakh (May) the sun rays was hardly reached at afternoon but now the sun rays are there only at day time (Mero aankha le dekhe samma yes thauma bali ko namma makai,kodo, tori ra vatmas ma hunthiyo, aru hudainthiyo. Ahilae yes thauma ghahu ko tayari gardai chhu kina vane jamin sukhha hudai gayako chha ra ra mato pani ramro chha - Mailee Tamang”).

Changes in timing of Snowfall: Lakuribhanjang mainly had some amount of snowfall during winter (January and February) than summer season. Only in winter season local people expected the snowfall amount around this area. They used to get some sorts of amount than the lower range remaining for $\frac{3}{4}$ months in shelter area and diminish along with increasing temperature. Local people perceive the dew dispersion along the farm and forest area in the deficit of snowfall. The dew was spread all over this area while awakening in the early morning. At the top of Lamatar snowfall was over the day but now it is shifting and declining from there. Local people used to predict according to the climatic condition of previous years but now they do not get the amount in same months. They expected the snowfall during Poush (Jan) and Magh (Feb) according to the nature of cloud by generalizing it as this: the cloud used to move across the sky than the snowfall was natural and predictable but now it is impracticable to predict by seeing the individuality of any. But now it is hardly seen and fall the snowfall in time but it is shifting gradually than the past calendar. The local yields were scarcely survived by snowfall effects in the past and would get the sufficient amount in next season. It is believed as useful instrument in life ways strategies but now it is declining immensely in shifting time also.

Rainfall: Local people were highly believable on monsoon rain because it was regular and enough in late Jestha (Jun) to beginning of Bhadra (Aug). That time was very important to involve in farming activity in terms of other months and it was raining till Bhadra(Aug) which causes water reservation on the other hand due to the rain small and big floods flow were seen there. Local people were aware of this rain because it was huge flow of flood seen at the evening time. They entered in their house in the early days and ate the food in time because the heavy rain always supposed to bring ruin in natural system along others. Now the monsoon only seen after 15th of Ashad

(Jul) in tiny amount as it is more active after this month and remaining over the Bhadra (Aug). It is altering towards the next month and disturbs the local harvest. To prevent from such calamities they follow the safe land, planting of big trees in land sliding area, stone made houses around the community and also make stone bar for small floods.

Rainfall was occurring frequently over a year except 2/3 months but now it is scarcely expected in some sorts of amount. The rain was continued till 1st of Bhadra (Aug) but it is unpredictable for local people. People act and response on the basis of rainfall pattern and follow the traditional activity. So they interpret as, *'Twenty Two Times of Rain Occurring within a Day of Rainy Season'* (Baiesa Jhera Sisnery Vanenathiyo). People could have felt the difficulties in rural life due to the regular rainfall of day and night. They socked land sliding, flood and ...so on in this area because it caused the problem in rural life.

"When we were small we used to plant fruits (orange, apple, peach, pear, banana ... so on) nearby the farm and others tree species (Pipal and grass tree) are also in the edge of deserted land of community. Except the plants, they used to believe that the branch of tree would survive in Ashad (Jul). We had a fear of flood nearby the home and should aware of the rainfall until stopping it and it was believed till Bhadra (Sep). But now it is hardly survive when we plant the fruit or tree in Ashad due to the insufficient rain along with shifting nature. They have complicated to run with seasonal calendar of rain due to the uncertainty of monsoon - Shiva Ram poudel.

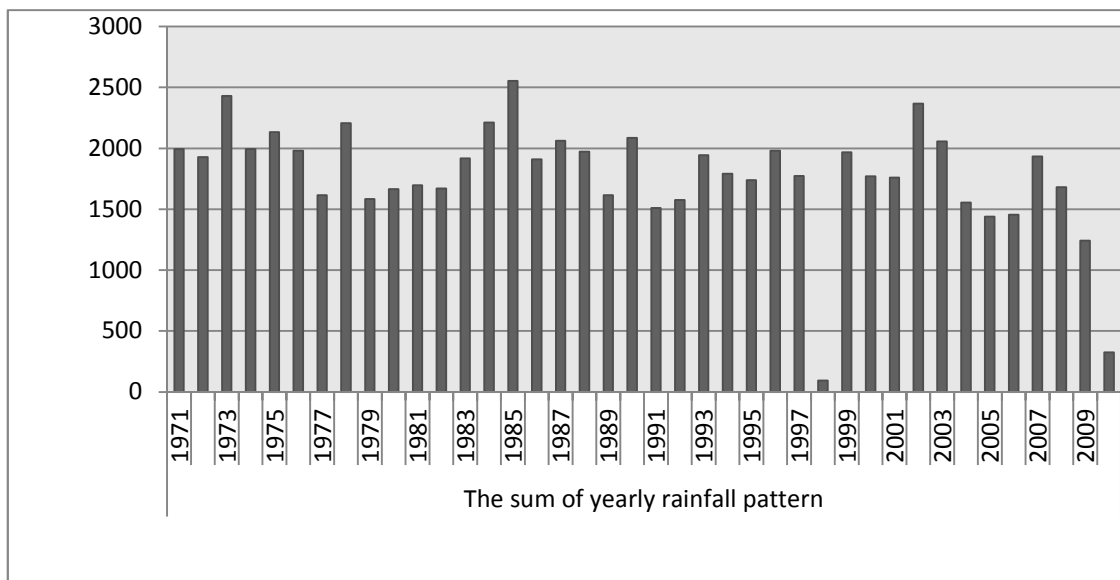
Again in winter season, there was complicated life of people during monsoon season because they couldn't cross the local river in rain season. But now it is absurd for elderly people. People used to be busy in farming and planting during monsoon season but now such activities are not expected in time. The rain that elderly people used to

tell will not be remaining at present. At that time they also believe the features of birds, insects and animals along with behaviour.

‘A single black crow only used to cry at Chaitra and Baisakh (April and May) after dawning or mid night time if so it is believed to be raining soon. Besides that, when existing creatures are moving from one place to another with feather than rain used to begin. But now such indications are seen rarely but couldn’t be as past. Again they reported that animal and birds behavior seen as an indication of rain sooner or later in this area before pre-monsoon.

The rain was regular and adequate for sustaining their life but the altering nature of rain has added sturdiness in livelihood strategies in one hand and the other hand it has been demanding local need of people. The rainfall and seasonality is altering altogether in their views. It is also examined and analyzed from the recorded data of rainfall. The available data of rainfall from 1971 to 2010 is presented below.

Fig.4, The following figure indicates the sum of data over a year from 1971 to 2010.

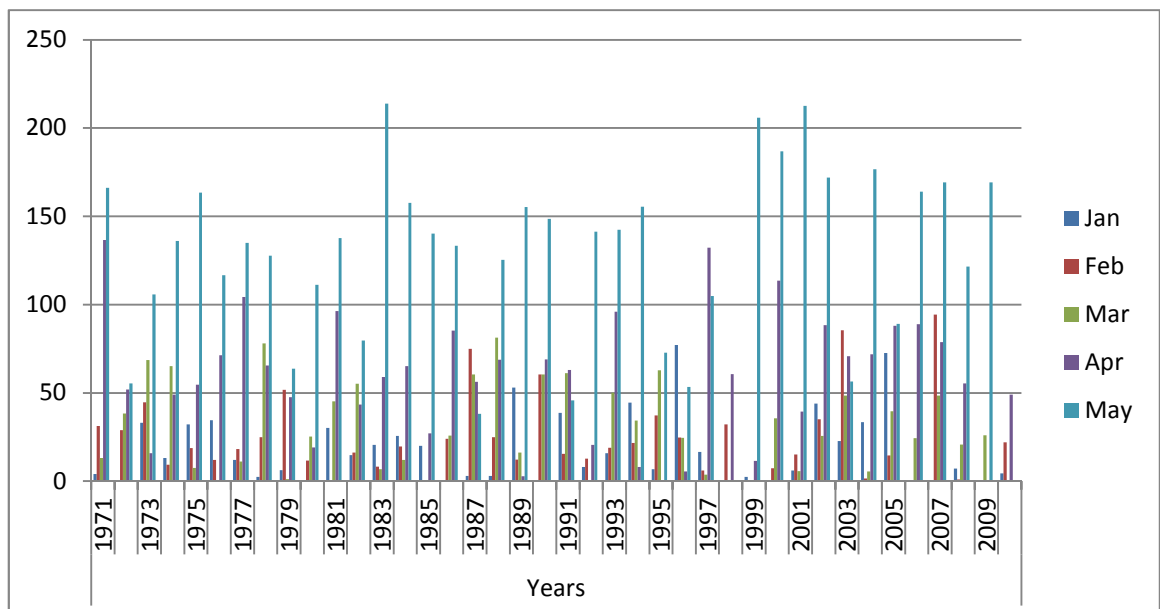


Source: Department of metrology, Babarmahal, Substation Lamatar 2011.

The above data presents the rainfall pattern of Lamatar which have been fluctuating regularly from its beginning. We examine the data from 1970 to 2010 than it is varied

to each other years. The rainfall amount of these years 1973, 1975, 1978, 1984, 1985, 1987, 1990, 2002, and 2003 has recorded above 2000 mm to 2500 over a year. Among these years there are 1973, 1987, and 2002 has more amount than others. But the 1971, 1976 and 1996 has 2000 mm rainfall over a year. The amount reflects the fluctuation of rainfall pattern gradually in Lamatar. Again the data reflects the similarities and dissimilarities of rain till 2003 and it was near to 1500 mm but later 2003 have fluctuation in amount. Lastly the rainfall amount is recorded between 1000 to 1500 mm in rest of the years. It was more or less similar to each other but at present it is differing gradually. Again the data indicates the rapid fluctuation of rainfall amount with some uncertainties. But the indicator in the figure shows some missed data of 1998 and 2010. Local people understand the climatic condition into two periods of time over a year; Pre-monsoon and Monsoon.

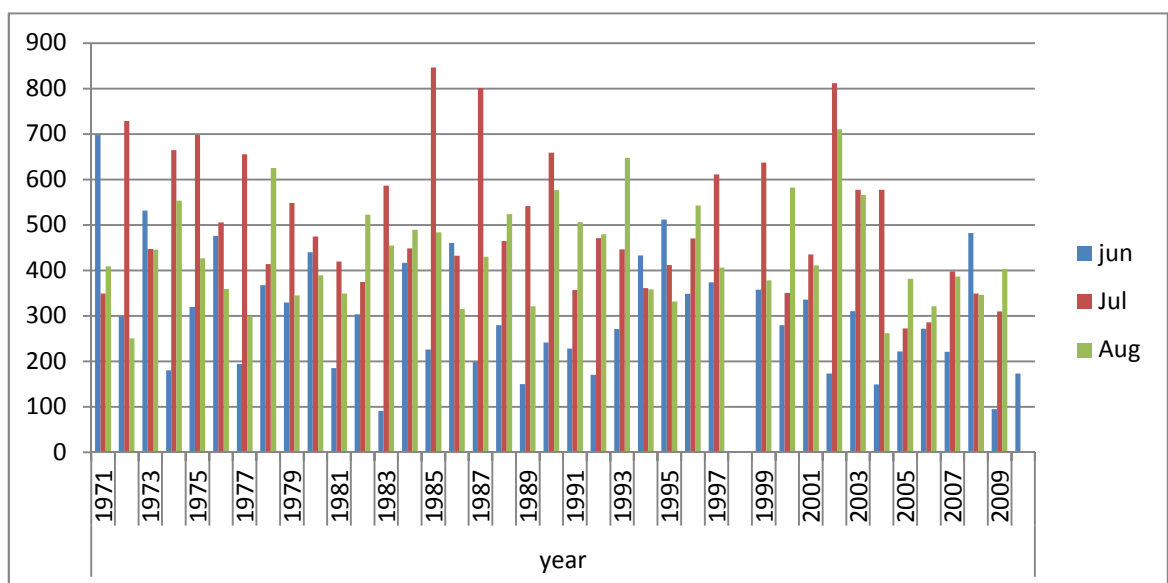
Fig. 5, The following bar indicates the **Pre-monsoon** months: Jan, Feb, Mar, Apr and May of 1971 to 2010.



Source: Department of Metrology Babarmahal, Substation Lamatar 2011.

The rain begins by Jan, Feb, Mar, Apr, and May in local people's calendar. Jan (Poush) is known as beginning of monsoon and later it is continue in any amount. There were some sorts of amount except some the years. It was more often similar in coming year but now it is fluctuating one after another year. Before 2005, there was a rain except these 1972, 1980, 1986, 1990 and 1998. Later of 2005 it is drying gradually and the data of 2005 to 2010 is the evidence of it. The above data symbolizes the reducing amount of rain in Jan. Again the Feb (Magh) has some increased amount of rain than previous month of each year. These years 1985, 1999 and 2006 are drier in Feb. but others are with some amount. The rain is more in amount than previous month but it is decreasing comparatively in other years. The March (Falgun) has more rain than other two months but the rain is comparatively similar. The Apr (Chaitra) has adequate amount of rain than three months of each year. The rain is similar to each year and it is decreasing without any dryer months in coming year. Lastly May has some more some dissimilarity of rain from 1971 to 2010.

Fig. 6, During monsoon season Jun, Jul and Aug from 1971 to 2010 is presented below.



Sources: Department of Metrology Babarmahal, Substation Lamatar, 2011.

The above indicated months are known as monsoon months. As from the above data of 1971 in Jun (Jestha) has adequate amount of rain but after that there is not similarity to this year. The rain is inconsistent and declining between the years and the months. The July has most and least amount of rain in forty years period. But it is rapidly decreasing in Lamatar and others are too. Lastly, August has some similarities and dissimilarities too. The month has increasing amount of rain than others two months. Again it indicates the decreasing amount of rain in Jun and increasing amount in Aug. which symbolizes the shifting nature of rain as well. This month's has more amount of rain before two months. But 1978 and 2010 has missed data at all. In past, there was 700 mm rain only in Jan of that year but later we see small quantity of rain with other months.

5.1.2 Relevance and reflection of perception on rainfall: Local people have their own understanding about the local phenomena. They perceive the idea by their close interaction of the surrounding event. On the basis of their local knowledge they follow the local calendar and sort out the year into two seasons. In fig. 4 the amount of rain is recorded high between the periods of 1971 to 1985. Elderly people had a belief that the rainfall was not cured much because it was sufficient all over the area. Those sorts of amount could help local people in their life long strategies. They again believed on the constant amount of rain during early age except some years and expected rain after 8/10 years interval. Locally they used to face the challenges of climatic phenomena in their local ground. In this sense, younger participants are not agreeing to elderly people's views because younger uses to tell it unexpected result when happening in local area. Both the views are not similar to recorded data because fig. 4 shows the total amount of rain over 2000 mm one after another year. In the past local people also believed on the amount of rain although it was not similar in amount. Rainfall was

occurred near about 2/3 years time interval in the past but it was gradually differing more and more. The rainfall data is above 1500 mm till 2003, than after it is diminishing rapidly and staying up to 1000 to 1500 mm. Local people says that the rain was somehow similar in the past but will not remain constant in forthcoming days. Rural people expected the rainfall after 8/10 years time period in the past and it was to be so but at present it is changing with some extreme events. But now it is seen in short period of time with unexpected quantity. On the basis of rain people understood the seasonality of a year and follow the rural strategies of rural life. They interpret the rainfall events are fluctuating one after another year. Its precipitation has been changing from 15/20 years before. They faced more challenges after 2050 (1990) in amount. The younger and elderly person also believed on the changing pattern of rainfall where as middle younger believe as usual till this time. The data from 1970 to 2010, we couldn't see the regularity of rain and its amount as well but it was enough for their use. According to them, the rainfall was appropriate before 15/20 years and 15 years for younger people. The amount of rainfall was slowly decreasing but later it has been rapid fluctuating in its amount.

The small pond was always with water in twelve months, this was full during monsoon and a bit drier after monsoon but now it is only full at the moment of rain and rapidly decreases even in rain season which is not imagined during pre-monsoon period. Now the in amount and when monsoon rain occurred than the water was over – Surya B.K.

Elderly people were hopeful for the timely rain but now it is doubtful for them. They could follow the timely calendar in the past but not are living with insecurity. The rainfall was enough during monsoon but it has been fluctuating gradually. Again local people interpret that the previous year's rain as a determinant of next year. On the

basis of past years rainfall pattern they follow the coming year. But the data somehow seems so but not proper. The elderly people believe on the rainfall amount of Magh (Feb) would be expected in Ashad (Jul). In the past that sorts of belief system in local area and the rain also supposed to be so. But later those types of timing are varying with people's activity. It is shifting from its amount and intensity during monsoon and pre- monsoon season.

During monsoon there was massive amount of rain in local area but now the water sources are also expected during Jun, Jul and Aug all over the area. In this time, late of Jun or first of Ashad (Jul), it occurs in small amount of rain late of Jestha (Jun) or Ashad (Jul) in this area. They believe not only in shifting nature of rain but also the amount of rain. On the other hand it is being delay than 10-15 days than previous time in their ideal understanding. They could do their activities due to the timely rain but now it is vague to follow the traditional calendar. They could collect crops in actual amount of it but now the sky is threatening local livelihood strategies of people by sound, rain, storm and lightning at the time of harvesting period. So it makes difficulties to work properly in their schedule plan because of altering rainfall. The rain is happening unexpectedly at present. Local people urged that the present rainfall situation is rapidly fluctuated during season. Locally they expected the massive amount of rain Ashad (July) but now it is unconvincing to all people. It is regular in other two months with more amounts than it used to be Ashad (July). The rain has been shifting and happening further and further. The amount of rain and the people's attitudes are similar about the rainfall happening. It is seen in Bhadra (August) before two months which was only seen in the beginning of monsoon season. As from the local aspect the rainfall event has been shifting further than the previous months. The amount of rain is becoming less than they hope at monsoon. People couldn't do their

proper activity in right time and it is being difficult for rural strategies. During monsoon people could hardly see the sunrays in a week but at present most of the days are sunny. Again they are suffering from uncertainty of it during harvesting period - Ashoj and Kartik (late Sep to Oct). Again there was similirity in Jestha (Jun) with certain months but now the ratio of rainfall is changing rapidly over the year. Among three months, it is similir in Shrawan (August) which is about to be changed. This figure clearly indicats the amount and intensity of rain altering in the present time. People can realize the reducing nature of rain after 1995 and also can be seen the huge amount in 2002 later it is diminishing rapidly. Local culture that they used to follow in the past couldn't do in same calendar. Rural strategies of people are falling in risk along with climatic conditions. The traditional life styles and culture has been changing with seasonality.

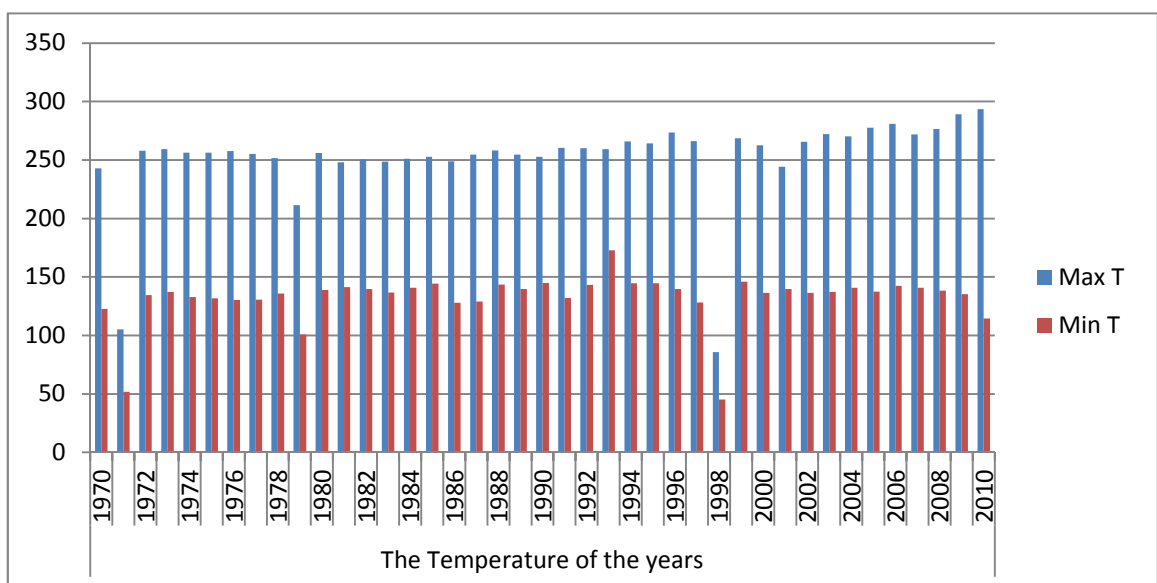
In the early days pre-monsoon used to begin by monsoon but now it is beginning late than the past time. The figure 5 indicates the decreasing in amount of rain like previous figure. The untimely rain largely effects on water, forest resource along with local livelihood. In every month, the rain is inevitable in some sorts of amount than rest of the months. People are very aware and hopeful in Baisakh (Jun) and prepare their activity on the basis of it. The rainfall of these months Baisakh (Jun), Jestha (July) and Ashad (Aug) was increased in the beginning and gradually decreased in its amount. The amount of rain is massive in Jun than other two months but now it is opposite to that view. Before forty years there was consistent nature of rain over a year and it used to be so in other years. Bu nowadays it is decreasing from some years in some months. The Jul has more precipitation than previous year. People are relying on this month for plantation. Lastly the Aug has no more amount than Jul. It has more than Jun and less than Aug. People believe that the rainfall can positively contribute

the livelihood strategies of rural life. But now the rain has been becoming less and late in monsoon period than past time. People could hardly see one or two months dryer in the past but now is about 4/5 month over the year. So, local people believe on the changing nature of monsoon in forthcoming days and it will be increasing day by day.

Temperature: Elderly people classify the year on the basis of temperature. They follow the seasons as winter and summer. People used to wear the slightly thick clothes even in summer season but now it astonishes them. Younger person couldn't believe on their parents' usable clothes were same in summer and winters seasons. It means the increasing temperature is a way of their present thoughts which they have really felt in their own lifetime. They interpret the temperature as it:

In our early age, we used to go to school in early morning and return back at 1.15.P.M in summer season. At that time we were used similar types of cloths in winter and summer season but now we could not wear those sorts of cloths in summer. Being an old we wear thin cloth in evening and morning at present and still it bears sweet in body in summer season - Bhoj Prasad Timilsina).

The fig.7, The maximum and minimum temperature from 1970 to 2010 in sum.



Sources: Metrology Department, Babarmahal, Substation Lamatar 2011.

The above data presents the detail of maximum and minimum temperature before forty years to present condition of Lamatar. There are variations in maximum temperature along with minimum. The maximum data indicates the gradual increases of temperature which is varying day by day. The temperature was recorded 242.8 before forty years and it is the least temperature until 2010. Each year clearly indicates the gradual increasing ratio of temperature and its ongoing condition. There are some similarities with a bit more differences between the data of each year before 1990s but after 1990s, the ratio of temperature is increasing highly till 2010 than before. The increasing ratio of temperature is from 1970 to 1990 is merely a 4.2°C between twenty years period. But after 1990 to 2010, there is an enormous difference between twenty years period. The difference from 1990 to 2010 is about 40.9°C . It indicates the infinite differences of temperature in twenty years time duration. It is approximately 2.04°C ratio in each year. Again, while we compare the overall temperature of 1970 to 2010 than there is a 50.7°C difference in forty years time interval. The increasing ratio of temperature is 1.26 in each year except these 1971, 1979 and 1998 missed data.

In the early days people used to their activity without any feelings of hotness even in summer season. They only felt and drain out the sweat while working hard for subsistence life styles. But now it is difficult to work properly in the summer time.

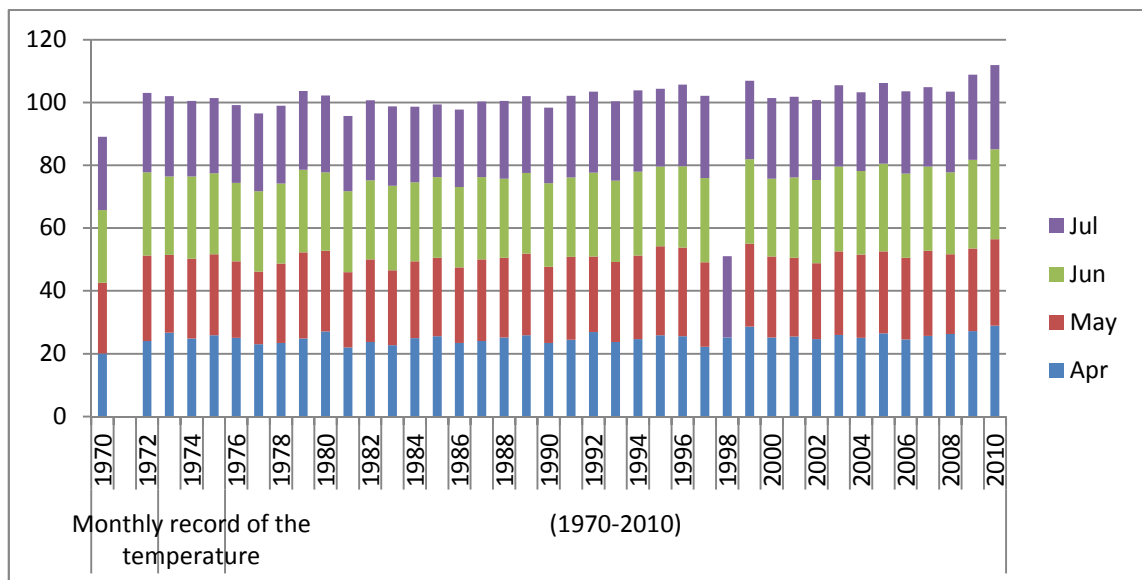
The minimum temperature also indicates the variation of temperature across the forty years period but it has less differences in data. Here the data of 1970 is 122.6°C which indicates the least temperature among others years. We see the fig. 7 has a bit more increasing temperature till 1973. It is decreasing gradually till 1977 and increasing until 1981. Until this time there is not any differences of temperature as like in the past. There are instability till some certain years but later has differences to each others. We see 1994 to 1997 has increased ratio of temperature and later 1999 has got

more than before. In 2000 to 2010 has regular reduce in temperature. The recorded data of 1970 to 2010 is varied in 20.9°C in minimum temperature average. The figure also indicates that the maximum and minimum temperature altogether. The minimum temperature is increasing in the ratio of 0.52°C in each years.

Local people differentiate the temperature based on the hotness. They sort out the months on the basis of temperature ratio and follow it as summer and winter season.

The following data represents the summer season from 1970 to 2010. Locally people understand these months (Apr, May, Jun and Jul) as summer season.

The fig.8 indicates the sum of temperature in these months during summer season.



Source: Metrology Department, Babarmahal, Substation Lamatar 2011

While examining the maximum temperature in Apr. of 1970 is recorded 20.1°C and it is increasing till 1975 and later it begins to decrease. From this data we can examine the $2/3^{\circ}$ temperature differences between 2/3 years time duration. But while we compare 1970 Apr to 2010 Apr, than we see a bit more differences of temperature. The overall recorded data shows the 8.6° differences in forty years period in April. Similarly, May has 5°C , Jun has 5.6° and lastly Jul has 3.4° in forty years time duration. So the Maximum temperature of summer season has more fluctuation than winter season. But

the ratio of changing temperature is recorded in the data and as well as reported by local people too.

There we see the changes on maximum than minimum temperature in above data. There are gradual changes in the ratio of temperature in each month of the years. The months Apr, May, Jun and Aug from 1970 to 2010 has regularly changes in the ratio of 2.8, 2.9, 0.3 and 1.9 in temperature. Similarly the temperature is increasing in winter than past year.

5.1.3 Relevance and Reflection of Perception on Temperature:

The temperature of summer is only presented in fig. 8, with the data of the months. From 1970 to 2010, there is a fluctuation near about $2/3^0$ c in Apr (Chaitra) only. It was constant in Baisakh (May) Jestha (Jun) and Ashad (Jul). Mostly they believe on the constant temperature over the year which reflects the seasonal behavior of vegetation pattern including other activities. People could hardly feel hotness over the year but it was cool in the past. They used to feel the eight months as cold season and rest of the months are hot for them. Local people have their own feelings about the temperature which they perceive in their day to day life. They think the winter season has been shortening about two and half months on behalf of summer. People express their local feelings in temperature and say; the Feb (Falgun) is hot like May (Baisakh) at present but the Baisakh (May) has more hotness than past. The available data also represents so. Local people can't assimilate the temperature of past with present because of their past feelings on it.

“In our small age, the temperature was up to maximum 25^0 in the summer but now it is up to $30-32^0$ c or more in same time. Now they feel the differences of $3-4^0$ c. Again they reported the hotness is becoming longer and the winter as shorter. The summer season and winter had own view about winter, the maximum temperature of this area was

near about 12/13⁰ but at present it is about 22/23^{0c} (Yas thauma sabai vanda garmie hune vaneko char mahina (Chaitra, Baisakh, Jestha, Ashad) 24/25⁰ jati hoo tara, tetee garmi lagdaina thiyo vane kam garna sakthiyou, tara ahilae ta garmee ma (Midday) kam garna nikai garo hunchha, haluka kam garda pani pasina nikai bagchha vane yeha ko ahilae ko tapkram 30/32 pugchha hola, ajha garmie samaya lamo lamo hudai chha. Jado samaya ma nikai jado 12/13 hunthiyo vanae, ahilae 22/24 jatipugchh holaa”- Hari Shyam Ghimire).

So the above data signifies the similarity and dissimilarity on local people's views in different time periods. The data symbolizes the increasing temperature over a year. There are 2/3⁰s differences in both seasons, whereas local people urged 4/5⁰ differences in the past. Rural people believed on a longer winter but now it is becoming shorter. They believe Chaitra to Ashad 1st were the months of summer and remaining eight months were known as winter in their understanding. But now those months are changing into winter. They used to wear thick clothes in the eight months including Feb (Falgun) but now these months are in the ratio of increasing temperature. On the other hand Falgun and Chaitra (March and April) are now being hotter because the snow of the Himalaya is not remaining thick and longer. It is believed that the snowfall of Himalaya directly interacts with the environment and maintains the local temperature. The late or heavy amount of snowfall in Himalaya leads the distribution of temperature in this area. Local people are relying on the temperature of Churia as well as Himalayan range.

5.1.4 Frost and Mist: The weather was appropriate or suitable for local people in the earlier time. They used to do their local activities according to the weather phenomena. Their subsistence style was also shaped by the local climate along with

natural calamities. While talking about the frost and mist to elderly people they described it as:

“The frost had covered all over in Lamatar but it could be seen in valley after 15th of Aug (Bhadra) (Kuhiro tala dekhi mathi samma lagthiyo barsaat ma tar upateka ma 15 bhadra pachhi matra lagthiyo” - Basanti Thapa and Prem Damai).

The frost was thickly seen and scattered around Churia range after the monsoon rain but now it could only be seen thinly in this area. Mostly the higher part was always covered with frost and sometimes by mist. It was complicated to local people due to the thickness in rainy/ winter season and hence no one could do the activities easily. Again their local perception was that the Kathmandu valley was covered late 15th of Bhadra (August) from frost and but now mist is seen more than frost. The frost and mist couldn't be seen during winter season but now mist and frost disturb the rays of sun. It continued to one week or more but it was not only in Lamatar but also seen all over the area.

5.1.5 Changes in Cloud Direction: The cloud whenever came from eastern to western then local people expected rain and ready for forthcoming activities but now when cloud from south to eastern than rain begins gratuitously. Local people reported that the grey color used to symbolize the inevitable and massive amount of rain rather than the black cloud. On the basis of natural event they used to follow the indication of cloud and prepare for their mind set. In the past sunshine and temperature was also suitable for local people in the winter.

5.1.6 Extreme Weather Phenomena: In every year, small and big types of events (sliding, flooding, and raining) are expected during monsoon in local area. From such events the stone, wood and sand are found there at rainy period either that is rainy or not. It was extreme in the past but now it is becoming less due to the reduced rain. The

rain was appeared at first of Ashad than later the water resources was everywhere and people couldn't leave their Ghum due to the huge rainfall. The local area used to encounter land sliding, tree felling and so on... during monsoon season. Except that the snowfall was occurred in the bottom of churia range and destroyed the local crops as well as grasses of the farm.

5.5. Perception on non-climatic indicator.

In every step of people have knowledge and perception to view the present situation. People are interpreting the non climatic variables as climatic indicator in their physical world. People have their transmitted knowledge along with sensory perception to interpret the local phenomena. They just visualize the climatic variables with less use but the non climatic indicators are deeply rooted in their day to day activities. Apart from this, those types of variables are seasonable along to the seasonality. They interpret the non climatic indicator as this: Flowering, ripening, maturing and growing along with the size, taste, color and quality and quantity too.

When we were small our parents compelled us to go school in Kathmandu but we were more obedient to grandparents rather than parents. We used to go to forest for cutting grass, collecting leaf litter, wood, fruit and other forest products during summer season. It begins by flower, fruit and new greenery in local forest which was very romantic in one hand on the other hand the forest insects and birds crying were equally listened across the forest area which reflects greenery of forest with fruits ripening at the moment but now all are changing from the past situation - Jurali Khatri and Mega Raj Ghimire.

These types of changes were only occurring from the beginning of summer season but now people usually find the different forms of changes untimely in their physical world. Locally they used to break the Kafal and others types of activities were only

done late of Chaitra (April) and from the beginning of Baisakh (May). The fruit were eaten by mixing the salt in home. But at this time it is impossible to eat even by mixing the salt because its taste is not like as past. Besides this, they used to collect the Laliguras for their homely use as well as they kept it over the door because they believe that the snake can die when it entered under of it but now the flower are unnecessarily found before and after 2/3 months of summer season that why we leave it as our cultural practices just at this moment.

People reported that the local resources were across the Churia range with different forms. Due to their daily interaction with local forest they perceive the different kinds of resources around of it which they culturally used in various purposes. The noted tree like Pipal, Sal were in the middle of Churia range during the early age but now such trees are declining from there and can be found nearer than the particular area. On the basis of these trees they replied that the other kinds of species are migrating up and down from there. The small bushy plants are migrating upwards and tall trees are downwards respectively. Younger has rare interaction except fruit breaking in the season but they think about replacement of plant species. They know it on the basis of their use and unused which is changing gradually.

Again the majority of the people are realizing availability of fruits, plants and water resources at present is thinning from this area. From early mornings to evening people are involving in outside activities rather than domestic. They share their childhood feelings below.

“When I was 12-13 years old, I had gone for breaking Kafal in the middle of Churia leaving the cattle in the greenery area and returned back by carrying the Kafal with my cattle. But now such fruity trees are nearby the community with more species and

the greenery of that area seems sooner although it is banned for all with some rule and regulation in its needs” - Jhalak Bahadur shrestha.

5.2.1 Seasonal Behavior of Plants and other Species

Local people were waiting seasonality including the forest species in their traditional calendar. They expressed their knowledge and experiences on the basis of their traditional calendar. Some kinds of changes are known by interacting with forest and some are from the visionary of eye. In the early time they used to classify the local species according to the basis of their calendar and their living strategies too. The local plants and species were only seen late of Chaitra (April) and matured over the Baisakh (May) but now such changes are occurring before and remaining longer than the past. Local people followed the traditional calendar for their forest activity because the vegetation were only appeared late of Falgun (March) to onwards. Those types of changes (flowering, fruiting, maturing and ripening) are in forest species along with noted tree Laliguras, Kafal, Koirallo with local fruits. They differentiate changes on Alubakhada, Peach, Pear, Banana and Papaya. These types of fruits were used in various ways like worshipping god as well as in other activities. People mainly used domestic fruit at the time of god worshipping in their cultural use. At present they hardly find it inside of the community. In our small age the flower of courtyard used to reflect the coming festival by its characteristics but now it couldn't blossomed properly and it is not happening in time. The sishnu was growing everywhere and it was used as vegetables (Sishnu) late of summer season but now it couldn't find as like past. It mainly found thorny at the end of summer season but now it finds before and remaining late in their social world. It is drying without leaves and greenery.

Except the seasonality of forest species they reported the animals and birds features on the basis of their traditional knowledge and experiences. The quail usually lay eggs in

the beginning of winter season but now it is thinning from here and might be differing the timing of its lay time. On the basis of other birds behavior they thought the eggs and mating selection is supposed before than the past time. Sometimes they hardly heard the sound of mate selection (ka ka ka in small voice) which is nearly one month before but when it laid eggs than it cry largely and live with male for collecting food. Besides that the other birds and animals were crying continuously over a day in the top of Lamatar before sun setting. But now the habitat of such birds and animals along with sound frequently heard in day and night around the this area. These kinds of behavior are seemed moving from one area to other ecological area in same season which was not seen as like present. People culturally interpret the cock when cry after sun setting than they took it as a symbol of unhappiness cut it instantly which was not found normally after sun set. Now it finds frequently crying over a day and night at home and it is taken easily inside the community area. They reported the seasonal sound of Crow; Koilee and Kafal Pako are changing along with habitat. The birds/animals are moving from here to there in winter and summer in search of appropriateness. Now they see new birds coming and their habitat in the small tree in one hand and the other hand some kinds of birds and animals are migrating in other area which is also astonishing event for local people.

Chapter VI

6. Exploring local knowledge and experiences on climate change:

Some reflections are from the corner of Lamatar

6.1. Knowledge and experiences on forest - climate interaction.

The Lamatar area belongs to these communities (Tamang, Newar, Dalit, Bhamins and Chhetri) having rural life ways and cultural practices differently. These community groups have different knowledge and experiences about forest and climate phenomena. They follow the traditional knowledge and practices in the social world based on caste, age, occupation, settlements and geographical condition too. In each community female only were involved in forest and domestic activities where as male were also involved in different forest activity like cutting wood, tree, planting the plant species and so on. But female knew more than male because they were much devoted to forest activity for their subsistence life styles. They used to cut the greenery of plant, plant species, collection of dried leaf, fading tree for cowshed and grass were the main things for their rural strategies. On the basis of their activity they knew well about the deciduous, non deciduous and its seasonal changes in the ground. People thought that the rain plays key role for the growth, vegetation production and distribution of forest species. But the untimely rain has negative changes than positive on local resources. The traditional system of rural people is under the challenge of local weather and climate in its natural system.

Rural people relied on the forest and forest based activity reflect the local knowledge and experience of their surroundings. Local forest resources are viable instrument for rural life strategies which is threatening hardly over a year. Due to the uneven occurrences of rain the forest sources are inconsistent and irregular in its changes in local ground. The availability and distribution is unusual in its particular location and

space. The behavior of plants mainly recorded in their own world and can response it according to the seasonal calendar.

In our small age we used to go for cutting greenery plants for morning and evening times for livestock during Chaitra and Baisakh (April and May). The greenery only found at that time along with Kafal and Laliguras which were collected only after the 12.00 pm. Those types of activities were open for all but now we are not permitted in such forest activity except Kafal and Laliguras collection. The greenery of forest, forest flower and fruits are only seen from the distance in season which they suppose timing of it is becoming nearer to winter season - Raja Ram Poudel.

In the past people usually use to do their traditional activity in time but now the tradition of local people is differing than the past. The traditional activities are happening before than the past time. In addition to that small and big species of tree found in different location. In their past experience local forests species are migrating contradictorily in local area. They used to find forest fruit, wood and timber like tree are in higher range and small bushy at the bottom of it but now it is migrating from its particular position. The forest species like, Baaj, Katus, Koirallo, Laliguras and so on ... tree are migrating below and small bushy are over from the location in their present experience. Elderly people believed that the foundation of local species has been migrating from lower to higher place and lower too. Those big types of plants are nearly found about 100 to 500 m in lower area and small are nearly 200 to above in their local experience. Rural people have an expertise in rural living strategies including the natural phenomena of their world. They know the detail about small and tall plants which are varying and establishing new species with its gradual migration. Elderly people noticed that the local plants species are thinning and migrating equally from the particular time and place. These plants species (Amliso, Chutro, Madilo,

Koiralo) seems unusual in present time context. These kinds of plants had a cultural and social use in their social world. Amliso which they used to cut from the top of rock and found enough at that time but now its location is differing on hand and on the other hand it is thinning rapidly with some other species. It is mainly used for cleaning the home but now it is rare and if it is available than it is market oriented. Like on the Chutro and Mudilo were also used in social context for the treatment of injuries. Furthermore they share their local knowledge and experiences in these ways:

In the early time we (female) used to break fruit (Kafal, Aisalu and flower (Laliguras) everywhere around the Churia in the afternoon which was very hard to reach and collect from the tall tree. But now those kinds of tree species and related activities are finding near to the community.

Besides that local people reported the different things about the forest species that the male species found without fruit in lower area than after female follow back it. The female species after the male believed as a tree of giving fruit. Again they reported that the male brings only flower one and half month in its seasonal time. They interpreted species availability as: “First the male one interacts with given environment if that is appropriate than female follow towards male and it can easily bear fruit in that area - Sharan Shrestha, Govinda Pokherel, Maya Ghimire and Sapana Tamang.”

The fruit of higher range used to believe good taste that why they went to the higher range in search of tall tree. In this context people replied that the lower fruits of a season have not any taste like it was in the past. It is experiences by their hands and mouth together in the local ground. These kinds of species were only with fruit but now the same kinds of species are seen fruity and bare altogether. Rural people have observed different categories of plants and other species by their real interaction

during their life time. During spring season small plants are enough in our surrounding with varied forms but at present the bushy plants seems dense in higher part and thinning in lower among tall trees.

Local knowledge and experience are community based with many cultural practices in their physical world. They have local expertise in available resources. The climate has causes changes in all sectors including forest resources. Local fruits (Alubakhada, Aru, Kimu) has been changing in diverse forms with different location. For more detail they interestingly reported the local fruits “papaya” of their ground.

They shared their knowledge about local fruit: *‘Papaya always grows opposite of Himalaya in the past’* because the Himalayan environment directly effects on it and couldn’t survive. The Himalayan environment is unfit for the papaya in this local level. If they plant it in front of houses it couldn’t grow but when they plant opposite or unseen place of Himalayan environment then it can survive easily in Lamatar. .’

The past and present climate of this area is certainly be differing with many plants species. In the local area plants species has been emerging and establishing all over the area with diverse forms. At present the younger people also reported the availability of papaya tree over the area and believed the natural environment of Himalayan in this area. The Himalayan environment is a determinant of local climate which is suitable for growing fruits. Now they are planting the papaya near to the courtyard but it is tasteless for local people which were very testy in the past.

They did forest and farming activity for their coping strategies with local calendar of the social world. Some kinds of characteristics are reflected in the seasonal calendar of farming. Local people are preoccupied in the traditionalist system of community which is also affecting much by the local climate uncertainty. The local climate hazards are going uncertain with seasonal activity. In the early time they used to

prepare seasonal activities on the basis of their traditional calendar. But now it is being uncertain and inevitable in our local region. More over the knowledge and experiences are understood through this table.

Table 2. Local understanding of people - forest and climate interaction

Local Term	Traditional understanding	Present understanding
Magh(Jan15-feb15)	Forest activity based on season with rainfall, snow and dew was more.	Forest activities are rare and cold without rain.
Falgun(Feb15-Mar15)	Continue cold but easy for forest activities.	Flowering, ripening, greenery of vegetation pattern seeing before.
Chaitra(Mar15-Apr15)	Maturing crops and greenery of vegetation.	Maturity of fruits and increases temperature.
Baisakh(Apr15-May15)	Harvesting time, greenery vegetation, with storm and rain.	Blowing hot wind and increasing temperature.
Jestha (May15-Jun15)	Begins raining and preparation of seed plantation.	Light black color of cloud seen in the sky and doubt on monsoon.
Ashad (May15-Jun15)	Forest and livestock management with massive rain.	Begins raining and waiting for cutting.
Shrawan(Jul.15-Aug15)	Continuity of rain, maturing greenery of forest.	Rainfall increases in amount and people finished farming.
Bhadra (Aug15-Sep15)	Heavy rain till 1 st of this month and collect grass.	Continuity of rain over this month.
Aswin (Sep15-Oct 15)	Maturity of yields and grassy lands.	Harvesting and flowering season.
Kartik (Oct15-	Busy in forest and farming	Very clumsy days with scattered

Nov15)	activity, with sunny days.	rain.
Mangsir (Nov15-Dec15)	Cold and sunny days	Sunny and clumsy day.
Poush(Dec15- Jan15)	Difficulties in forest activities and relying in leaf litter for their livestock.	A bit easier to work but hard to sunbath because of the unusual sunshine due to the mist.

6.2 Knowledge and experiences on plant and other species: The plant species has been step down the plain area which reflects different assemblages of species inside the forest. In some areas entire plants species may be disappear along with new assemblages and new ecosystems may be established in this physical world. Major alterations in productivity and species composition would occur due to altered rainfall, temperature and seasonality which help to balance the ecological setting in Lamatar. Due to the altered climate the greenery of forest has been opposite of their traditional calendar. In their surface reading, the local grass used to be seen late of Chaitra to Baisakh (Apr to May) but now it is going late at present. The seasonal fruits and plants cycling were appropriate in their ideal calendar but now it is vague day by day. They are closely connected with forest related activities due to their rural life strategy from past to present. They found the timing of fruit ripening (Kafal Aisalu, Mayal, and Argelo) and blossoming of Laligura and Koiraal (a type of tree used as pickle in flowering time) is appearing one and half month before than their actual understanding. Again in their local calendar and timing of ripening is reported as below: Jamir, orange and guava was ripped in Ashoj and Kartik, Bhogate and Bimiro in Kartik 15th, Lapsi and Pear in Mangsir and Poush and lastly the Valayo in Poush and Magh. These types of fruit find in local world and used to eat in time but now it is

unsure in its seasonal calendar. They reported the tentative date of shifting than in their past calendar. Due to the changing pattern of climate, rural people used to go to the forest for breaking Kafal later one month than past time which is coming one and half months nearer. These types of ground reality are recorded by people in local ground. Among many they memorized the noted activities of their elderly age that is collecting of buds of Kooiral in mid Chaitra (April) but now they have experienced it as this:

We found these noted fruits and flowers Koirall, Kafal and Laliguras before 15 days, one month, one and half month respectively in its seasonality. Again local fruits (Mango, Alubakhada, Aaru) are also found shifting and migrating year after year from its timely calendar - Jhalak Bahadur Shrestha, Jurali Khatri and Nilkanatha Pokhreal.

Local people described the forest species and its availability is varying in local ground. They interestingly reported the event of local forest groups as this: *they found the female plants only bear a fruit in season but male has only flower and buds for sometimes. In their understanding, female and male tree species are either migrating lower or higher but the female gradually follow the male.* They found such plants species around in community which was found in higher range. Again in the past, people used to believe on regularity of fruits in female species but now they stunned and found fruits between the gaps of a year with small quantity. There were more fruits remaining in the tree but now it is hard to found longer without infection of disease. The mango had not any disease from its beginning to ripening in the past but now it is opposite of elderly scenario of fruit. They differentiate the taste of fruit during their young age to present is going to be changed. They reported that if any fruit are eaten as ripped then it defects on teeth because of its sourness which they

could easily eat in early time. Beside this they have knowledge about plants, forest species, size, taste and timing as well. Younger people have found differences of fruits were not so far long but it is nearly 8/10 years, but before that there was regularity of fruits either domestic or other. Those domestic or forest fruits was seen regular but now there is a gap of a year in same fruit. They found more or less banana before 15-20 years in every house but now the banana tree is hardly found in this community. Now those types of banana tree have been losing day by day and remained one also affecting by Gabaro (a kind of disease in local term).

Besides the forest species, local people have found mosquitoes everywhere in the courtyard which was only found in the boggy and shelter area of this range. Now the behavior of mosquito changing rapidly with varied forms. The crying, playing, and birthing place of species has been differing along to their productivity. Local climatic conditions determine the physical and nonphysical behavior of human and non-human beings in local level. Local people have also expertise on birds, animal behavior and their habitat. The morning features of birds have been changed than they used to listen in the early morning. They hear different sounds of crying, moving and gathering of local animals and birds as well. All over this area the animal behavior is changing inside and outside the forest. The domestic birds like sparrow, hen and cock used to listen in time in early time but at present those kinds of birds behavior is listened and seen all over this area. In the early time it was taken as a bad sign for household owner and instantly they kill in this area. These types of indications are frequently found in domestic animals and birds too. Now they do not have cultural practice to treat the animals and birds in their community area because the younger has changed their attitudes in such belief system. They generalize the traditional activity and follow the present situation that is occurring in their world.

6.3 Knowledge and experiences on forest and other activities from Lamatar:

Local people expected the monsoon rain in time in the past but now it astonishes the people in rural area. Local people had traditional activity for subsistence life styles which was only hoped in season. They not only depend on forest activity but also relied on farming system in their local ground. Mainly the farming activity of people including seeding in the farm begin during monsoon by first of Jestha (June) and started plantation late 20th of it. They started their farming activity from 20th of Jestha (June) to first week of Ashad (July) and it was local tradition and compulsion to finish in 15th of it. They had a cultural understanding about the farming system. They used to finish their farming activity before 15th and the crops will get in actual amount. But while it crossed the time line of planting than the amount would not be like timely production. Moreover they interpret the local event based on local knowledge and experiences.

‘Himalayan environment directly effects on local climate of Lamatar which was only after 15th of Ashad (July). So the local farming activity would finish before of this time line if not so than the local production suffered by many diseases and climate. Besides the seasonal rain, it used to occur at first of Ashoj (September) which helps to mature seasonal crops of local ground but If it is not in time than the rain did not occur and local production are under the effects. It was believed that the Himalayan opens after this time and couldn’t contribute as like timely rain of local level - Bhoj Prasad Timilsina, Sapana Tamang and Sitaram Lama.’

Apart from that, the local climate was determined by Himalayan in their knowledge and shared it. Whenever the snowfall was deposited thick than it laid the Himalayan climate constant but when it had small quantity than the local climate is also under the change. The present condition represents the real situation of Himalayan and its effects

on local climate. They use to analyze climatic condition of summer season on the basis of winter seasons. The environment determines the local climate and brings changes in physical world.

Among many of the forest resources the noted flower Laliguras was only one color in the past but now they found two types of color red and white while migrating in the lower area. They see and find those kinds of changed beside the community. In the early time, *elderly people have a belief that the water was under the Hadbed tree and we used to go there for drinking while we were there in our forest based activity like collecting leaf, grass and even fruit breaking in the forest. They used to worship the Hadbed (a kind of tree) as Indra God before pre-monsoon begging the rain of a year. Now the species of Hadbed tree couldn't found in that proper place and it has been only in lower area.* Like this there was huge deciduous tree with many species in greenery season but now find drying and changing untimely. The resources of water are thinning and diminishing from this area and it will remain only ½ years long if it is in this process. Locally they accept the water resources and its amount will not be available in their present experiences. Besides that, these herbal plants Runje Jhar used for making Agarbattiee and Batulpataee used for cold from this local forest which was valuable for local life ways strategies. Mostly they followed the traditional culture that was learned by their previous generation. Elderly people used the herbal plants in injuries time but now such plants are thinning and displacing from its proper place along with knowledge.

They break the forest fruit one or two months earlier than the past time and find it below than the location. They used to cut tall tree (Katus, Sallo and Sal) from the Churia but now are found below of this area. Now younger people have opposite experience about the similar forest species. The local climate has brought changes on

local forest, water resources, biodiversity and productivity of land with many others. All small and big existing animal (jackal, tiger and leopard) species were living inside the forest but sometimes they entered in community and destroy the local yields. But now these kinds of animals are rare and new animals are coming inside the forest area. They used to hear different kinds of animal and birds playing, crying and walking across the jungle but at present it is totally changed than previous behavior. Besides the birds and animals, there was small types of insects biting in legs and hands farm and river basin found. The snake was also seen frequently in summer season in lower range than winter over the year. Now the insects (Mosquito, ants and spider) and other are differing in color and size in lower part of Churia. *While Small insects used to bite in hands and leg than red blood was freeze in tiny spot in the body but now new species are seeing across the community which begins itching at the time of biting.* The new types of insects (mosquito and small insects) with transferrable disease find in community and forest at present rather than the past time. The leaf and fruit are found infected by insects in most of the plants species. These types of fruits like, Kimu, Apple and Banana have some sort of problems affected by the insects which were not in past but only found in water ponds in the higher range. Beside this, snail, spider, and mosquito were there but now it can be found in courtyard. So, people thought that the behavioral changes are determined by climatic condition of this area. Moreover the behavior of frost (crying, its timing and location), appearance of ants and snake indicated the beginning of rain. In winter and summer season there were different voices of birds from different angles while fetching water from tap but it is rare and the hearted sound is not the same animals and birds. Animals and birds along with other species indicate the climatic projection by their behavior (crying, jumping, running, battling and birds by crying, flying) in the early time and it was proper

understandings of people. But at present such behavior are not indication of climate projection in local people's experiences.

New combination of plants, animals and bird species are occurring and ancient species are migrating, disappearing from the particular area. To this context local people have been experiencing new things in their local world. The climate has been affecting on local ecosystem and assemblages of forest resource including life strategies. People know the about the living creatures and forest resources in the seasonal calendar. They differentiate the appearance and disappearance of living animals on the basis of their knowledge.

From the user group's view that their past experience and knowledge on climatic and non climatic condition has brought changes in physical world. Some were agree and some were disagree with vegetation along with living creatures. The elderly people have great knowledge about herbal plants, its seasonal character, uses and cultural significance as well. The adequate amount of rain causes the growth and loss of plants and animals species. They added the traditional plants (Runja Jhar, Batul Paatae, Rudilo) are vanishing from the forest because the monsoon has not been for the past species but for the new assemblages at present.

Local people know about plants and animals of this forest area because of their long interaction. The herbal plants, Utis, Banmara, Fern and Kalimuntae could easily found everywhere in the forest area but it is avoiding from this forest area. Besides these plants species, animals, birds and insects were also found across the forest while walking in the way but now animals, birds and plants behavior are not found frequently and similar as past. Those all are migrating from here and there with new species around the forest. The new species are coming inside the forest and existing species area losing from here according to the local climate. They expect those

animals and birds are later or sooner disappearing from this forest. Some of the animals and plants species are not seeing at present which they used to see in the forest area. Elderly people reported the plants species like (*Nigaalo, Banana, Sayapatri*), herbal plants (*Runje jhar, Batulpatae, Rudilo, Chutro, Gogan, Setojharro*) are reducing and thinning from the forest. The local cereals (*Soybean, Local Bean, Mas, Gaahat*) are also diminishing and avoiding from this community. Like others animals and birds (*Jackal, Kakakul, Titra, Vulture and Sparrow*) are losing gradually. Rural people express the experience on the basis of their activities. '*People used to through the dead body of animals beyond the community for vulture and jackal. After sometime the vulture reached for dead body by moving and would finish within an hour but now it is remained long and it creates difficulties in local environment. Now it couldn't be seen in the sky as in the past it was.*' Rural people have been experiencing the local climatic hazards with uncertainty.

6.4 Cultural subsistence system in their living world: People have been using local knowledge and experiences for interpretive world which is guided from local contextual event. They follow the traditional living strategies that they used to do in rural area with social and cultural practices. They used to make (*Ghum, Naglo, Doko, Vakkari*) big and small kinds of things from Nigalo and Bamboo from their local forest resources. It is used for keeping wheat, mustard yard, millet, corn, paddy and so on... in the season. Most of the people were depending on local made for the keeping of local crops. During the summer season elderly people used to make the local things for their homely use and they also made it for them who had not skill. All the rural people were dependent in local kinds of things made from the forest resources rather to rely on market goods. They have cultural practices to fulfill their common needs from the local resources although local resources are thinning and reducing from the

local level and create difficulties in coping strategies due to the uncertain of climate. Now the traditional knowledge has not been transferred to other generation due to the unwillingness of younger people. The local cultural system is changing hastily in comparison to past experiences and knowledge. In this sense, elderly people are losing knowledge and experiences from the community systems as well as the scarcity of local sources. They used to go forest area for various activities including fire wood collection for home which they fire in night time. They collected it in elderly peoples home for fire and spent the night by telling the tale of local area. But now no one could be ready for such community cultural system in the elderly people's home.

In Lamatar, the farming activities and vegetation pattern reflect the seasonality of local area. They used to make Ghum, Doko, Nangloo is losing from that community. Their subsistence system was depending on the forest but now that are changing from the inside of community. That types of local made were used frequently in each community of Lamatar but now it is rare and younger are relying in market. *'The local made Ghum (made by nigalo) was used for rainy season instead of raincoat and plastic of present condition. By the continued use of Ghum people had lice in their body due to the continuity of rain (Ghum odra Jumra pareko Pani Chha).* That was very useful in domestic use because that saves them from rain, storm, and hail. It was used frequently while rain used to be in Lamatar. There was no any tradition of umbrella and plastic cover in this community as like present. All the elderly people used to make those things because the local made are rapidly avoiding from the community. It is because of scarcity of knowledge and resources in local level. Younger people are upsetting for the local traditional activity of their elderly people including local resources.

6.5 Knowledge and experiences on extreme climate phenomena: Elderly people had faced many climatic events during small age by their own eyesight. Those people openly expressed their attitudes about climatic events of their life. Local cultural knowledge and experiences are under the circumstances of local events. The extreme events of 2004/5 and 2050 had ruined the houses, land, branches of tree, livestock and land sliding with bringing huge stone from higher range. They had lost many things from their community but there were helped from local community rather than the government side. At that time they were helped in any kinds for short term. They had local cultural tradition to solve local difficulties in such natural calamities. People used to prepare culturally for the forth coming event on the basis of their knowledge. They reported the cultural practices and local tradition of the community.

“Dhami and Jhakri used to play the drum while cropping the crops in the field it was for the protection of local crops during summer and winter seasons of their community. They believed that the extreme event likes: huge rainfall, floods, snowfall, thick dew, hail, storm, bird and animals couldn’t destroy the local yields in that area. In response of that, they used to get (cereals, rice, and wheat) in amount according to the local system, if not as their sayings they could not get any amount of it.” - Bijju Kumar Pokheral.

In the past such activities were usual inside the community which was essential for the local crop protection but now it is an issue of rumor for younger. But it was viable instrument for local livelihood strategies in their life time. Such extreme events were occurring in their surroundings and affects on agricultural land, fruits, tree, and yields with forest resources. Those sorts of event are rarely seen in this area. But now it happens sometimes and destroys the local resources which take too much time to recover from such risk.

6.5.1 Snowfall, Rainfall and hail: In the edge and top of Churia were covered the peaks, mountain and forest with snow deposits time but now it is becoming less in amount and deposit too.

“The event of 2021/2022 had covered all over this area and hard to go out from home. That time the snowfall was everywhere and it was hard to go for fetching water from the tap but one day we had use the snow as water by melting it in the pot – Bijjau Kumar Pokhrel.

Snowfall was usually scattering around the forest area of Churia range with whitish peaks but now it can be rarely seen around the area. They accept the gradual decreasing amount of it in winter season (Jan and Feb). They remember the amount and intensity is comparatively less than past. Local people have been receiving the snowfall positively because it uses to preserves the natural climate and soil productivity of their surroundings. But now the snowfall is scarcely seen only in higher range at winter season. Again they believe that the snowfall has preserved the productivity of land in the past which was fruitful for local farming activities. But now the snowfall is gradually decreasing and losing soil productivity of plain area and the boggy lands are gradually fertile for farming activities. They point out the shelter over of their house and said, *“This area was boggy and useless for us but now it is drying and preparing for plantation of fruit tree - Mailaa Lama”*

People reported some massive rainfall events in 2004/2005, 2022/2023 and 2028 B.S, in this area and it might be all over Nepal. Later the events are seen in 2033 (1973), 2038 (1978), 2044 (1984), 2045 (1985), 2050 (1990) and 2062 (2002). It was more or less in both season but regular in rainy season. After that they haven't experienced the climatic event till now. Among these, the event of 2038 and 2050 had destroyed and

crashed down the branches of tree, roof of houses, cereals along with livestock. Later the rainfall and snowfall was in 2038, 2050 and 2062 during winter season.

They noticed the rain and hail are coincidentally occurring in some years. But it was most in the past. In those years they have lost many yields in one season and found satisfactory in next seasons due to the positive contribution in local subsistence life strategies. People also believe that the higher range is always productive for rural life because there are some sorts of rain, snow and hail were occurring in different time period. Natural calamities are uncertain in Lamatar becomes unfertile in lower area.

6.5.2 Shifting nature of rain: People used to understand local climate on the basis of their local perception and they differentiate it by day to day activities. Elderly people used to prepare their activities according to their local calendar. But now they have been losing their confidence at all while doing something in that area. The climatic condition and its shifting nature are being problematic for local life ways. All over this area they are suffering from the uncertainties of rainfall pattern. They are not doing their activity before 8/10 year as they use to do in time. Younger people believed on the difference of rain before 10/15 years period.

Before 15th of Ashad people used to finish their farming and other activities inside the community with forest area. That time they believed on the timing of monsoon rain which was started late of Jestha (June) and finished before 15th of Ashad (July). They celebrate the local culture after finishing farming system. They used to eat Chiura and Dahiee in the occasion of finishing plantation which was proper in schedule but now it unsuitable to eat in 15th of Ashad (Jul) because the farming activity is going on until Shrawan (Aug). Again they believe that the timing of cropping maintains the taste of food. Now the local calendar of people is not appropriate for plantation and cropping

as well. They hardly finish their activities across the month and it is delaying gradually.

The vegetation pattern and farming activities used to reflect the climatic condition of Lamatar. Along with rain all the activities of people are shifting more than half month before than the past calendar. People's activities and their plan are undergoing changeable in present context. They experienced the timely monsoon begin late of Jestha (June) but now it begins late of Ashad (July) which causes changes on local system. All the people have accepted the shifting nature and its direct impacts on rural livelihood. The harvesting time of crops was at Kartik (October) in the past but now it is coming nearer even in same crops. Due to these uncertainties they are changing their main crops (Paddy) in different area because of its shifting nature. Again they couldn't get the same amount as they used to get in same yields in the past. The amount of old yields couldn't find in summer and winter season due to the seasonal precipitation. So, rural people are involving in different activities according to the climatic condition of Lamatar.

6.5.3 Changes in water flow: There was a water mill (Ghatta) in the river of Lamatar which was running over a year. All the local people were living in it for the local life ways. This was used for grinding wheat, millet, corn and so on... when needed. The flow of water is also enough in that time. But the flood of 2038 had swept away the stone mill and brought huge stone from the above area. It had added difficulties in local life ways strategies. From that time water resources are diminishing and challenging local system of this community. Elderly people claim that the water resource is diminishing more from 2050s and it was gradual in Lamatar. Now they are facing shortage of water even in their day to day activities. Some of the water source and the rivers flows are found irregular and sometimes it found dry even in monsoon

season at present. The flows of water are rapidly diminishing all over the area including tap; pond, stone tap and others too. They reported the seasonal flow of water is not remaining longer in rainy season. Again they believed that the water sources are drying sooner than past time. Again, it is very hard for people in drinking, irrigating as well as for livestock use. Now people are relying on the erratic rainfall of monsoon period but which was not expected in the past. They do not hope the rain as past but now they believe on uncertain of climate. Due to the uncertainty of climate the resources has been deeply drying in the edge of farm, forest and river basin too.

6.5.4 Storm and warming: Storm and warming was usual than present time. People only expected the storm during summer season but now it is uncertain all over the country. There was no any recorded event like rainfall but sometimes it used to be so. The storm has destroyed the local fruits and branches in 2028, except that there were no any effects in other side. But the rain was seen only one hour in that time. But now they do not have experience of storm that they had in the past.

People used the same cloths evenly in winter and summer seasons but only felts hotness at mid day of summer season. But at present people could feel cold near six which was nearly eight months in the past. The summer season is warming up and winter season also believed warming slowly. It is hard to work and live inside the house in summer season at present but it was normal in the past. They used to keep their livestock in home during winter because it was extreme in the Tamang community of higher range but at present it is normal for them and they do not have such cultural activity in that community. People at that time believed the cold starts only after *Janipurnima* and its feelings were only after 15th of Kartik (October). According to this calendar they follow local strategies which are becoming unsure for them. Local people are expecting the longer summer and shorter winter season at this

moment. The ratio of temperature is increasing slowly in summer but rapid in winter. They regularly use their thick cloths near about the eight months but now it is nearly six month at present. People have different experiences of warming in summer and winter season. They normally accepts the 4/5⁰ temperature increases in Lamatar than earlier.

6.5.5 Forms of vegetation pattern: Overall they emphasized the climatic variation in early age. They thought climatic indicators like temperature, snowfall, rainfall; water resource, frost, and dew are changing with non climatic indicator together. The fruiting, repining and flowering time is shortening for their local activity. Most of the people reported the size and taste of forest species are becoming smaller with local vegetation pattern. They found greenery deciduous tree in one month but now they found in next month. Local people have many experiences and knowledge in forest species during their life time but they say some noted name of plants species. They interestingly said that, '*the Sishnu used to be drying during Chaitra and Baisak, and greenery in Jestha only but at present it is destroying from here and remaining one are growing in Baisakh.*' There are other plants like Sishnu in Lamatar which are decreasing and migrating towards the plain area.

6.5.6 New varieties begin to reserve: Local people experienced the forest species and other varieties in the past but now it is unsure to believe in that. Now these types of species and others are common to them. The reservations of bushy plants like Kalimuntae are seen near the community which was only found in upwards of this area and useful for some sorts of injuries. These types of small plants species are finding in community with different forms. It is surprising to them because it was only found in Bagmati river basin. They used to bring that from there at injury time. Similarly, such other species are recovering this area unknowingly with various forms.

Chapter VII

Summary and conclusions

Climate change is now becoming public issue arising vigorously in local and global level with many aspects. Nepal for its geophysical structure is becoming serious country including South Asian Himalaya and non Himalaya region. All the sectors are under the effects of climate change whether that is natural or not but it is gradual and appears sooner or later in all level. Nothing at all remaining alone from the climate change effects in local and global level. The effects of change sometimes occur hastily and sometimes slowly in varied geographical location. Climate uncertainty brings challenges in rural area and their living strategies altogether.

Elderly people are stunned to these changes in their local level because of the scarcities and absurdity of climatic upheavals. More or less effect of climate change is felt in all sectors of this country. But more often it has been severely effecting in natural resources, agricultural pattern and respectively to other sectors. These all sector are undergoing changes in all level. Furthermore it can be seen directly in the Himalaya region as melting ice, glacial lake outbursts, sources of water and its indirect effects on forestry and agriculture too.

Lamatar is one of the area encountering climatic uncertainties around valley. People are more aware about the absurdity of climate in their local level. Local calendar of people was more systematic in the past and all over they followed this culture. On the basis of their knowledge they understood the local climate from their cultural interpretation. They categorize the year on the basis of climatic event. But now the timing is uncertain with changing calendar. The rainfall, storms, temperature, snowfall, and other climatic indicators are changing in amount and intensity over a year. Local people are expecting the climatic events untimely in their life time.

Climatic indicator and the local culture of their community are shifting together in rural area. Apart from the climatic indicators, non climatic indicators are undergoing change on behaviors, forms, size, taste and availability of location. People are being indifference and unsure in their community due to the unevenly occurrence of climate. The plantation area, local plants species and other available sources are drying and declining from the inside of forest area. Like Himalayan the plain and fertile areas are not remaining save from such calamities. The dryer land is drying more and the boggy land is about to dry but fertile for new assemblages of plants. Such climate uncertainties bring challenges and severity on life strategies of people and compel to response according to the climatic condition.

People perceive knowledge and experience in local system by their own culture. The day to day observation and interaction of people reflects the characteristics of climate calamities with forest resources. They act and prepare the forthcoming event according to the seasonality. They are very serious about present condition of climate because it has brought changes in forest resources. Some valuable resources are thinning and migrating rapidly from particular place. Also the availability of such resources is affecting on the subsistence strategies of people. People know the seasonal calendar on the basis of forest and farming activity. The seasonal activities are being uncertain with altering climate. They reported that the water resources are thinning from 1980s along with forest resources. They found all the things are changeable due to the climatic upheavals in local area.

Conclusions

This study has conducted in Lamatar to address the research objectives and research problems of the subject matter. It explores the climate change and its consequences in ongoing period. People believe on natural system of any and follow the traditional culture inside the community but now they perceive and experience varying events with uncertain climate. At this moment people temporarily follow the previous knowledge to tackle in local world because seasonal understanding of climate is turning fallacy and will be more in the future. The climate is inappropriate and adds rigidity in subsistence life around 1970s challenging on traditional system. Rural life style is depending on forest are vulnerable. The untimely fluctuation and alteration of rainfall pattern brings uncertainty in local traditional system of people. Again the temperature is also challenging on vegetation and other resources in varying level due to the untimely rain. Local activities are under of it because their traditional knowledge and culture are being rigid to celebrate due to uncertain climate. People have felt easiness in celebrating the traditional and cultural rituals inside their community but now they think it uncertain. Rural people are facing warming in natural resources and its direct/ indirect effect in rural life ways option. The weather and climate is understood interchangeably in local area but now they find it different in their ideal response. All the things and sectors are under the climate uncertainty brought changes on local and regional forest species with seasonality. People believe that the natural beauty of forest is declining unnecessarily in ongoing period. Local activities of people have now reciprocal relationship between the groups of people in the seasonal activity of forest and others. They have been following new coping and adaptive strategies in rural area. Again, people have changed the living strategies along to the climatic phenomena. They express the shifting nature of rain and its

viability in physical world affect direct and indirect in local resources. It creates problem in local production system and could get risk in their social world although, it has positive contribution in local ecological setting. They can act and follow the ideal understanding leaving the community based knowledge and understanding.

Due to the untimely rain and increased temperature forest and domestic species are changing astonishingly around the community. They perceive new forest fruits, flower, taste, size and vegetation pattern are uncertain with some dissimilar quality and quantity with the rainfall, snowfall and extreme events at present. Again they believe on local vegetation pattern is occurring with some new and old with diminishing way. It is an experience and knowledge that they have ever felt an application in different time interval. Local activities like farming, harvesting, grass cutting and fruit breaking help to analyze the seasonality and people's seasonal activity in the past but now it becoming unsure and unreliable continue. The changes on forest resources, water resources, plant species under the climatic hazards which is bringing uncertainty in its forms in the future. It is gradual and inevitable in all sectors but more to forest, agriculture, water and add risk to people's life ways strategies for ever if not we aware in the coming days.

If scientific predictions are to be believed environmental changes are going to be more extreme more frequent and more widespread than previously experiences in human history. But there were always floods, fires, famine and conflicts, and there is already knowledge on how people deal with these disruptions to their lives. Although these problems may not be new, the discourse of climate change with its scientific, economic, political and moral dimensions is a relatively recent arrival in the global arena and it is changing the way local events are framed and understood.

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Annex 1

Local Name of plants	Scientific Name
Alubakhada	Prunus domestic L.
Amaliso	Thysanolaena maxima
Amba	Acacia arabica
Aru	Prunus persica
Aru Bakhada	NA
Bekhainu	China-berry
Banjh	Wool oak
Banmara	Eupatorium adenophorum
Bans	Bambusa asudinacea
Banmara	Eupatorium adenophorum
Batulpatae	NA
Cheepalae	NA
Chilaunae	Schima walichii
Chutro	Berberis sp
Chairaito	Swertia kingii
Dubo	Cynodorn sp
Dudhe jhar	NA
Fern	NA
Gogan	NA
Godwari phool	NA
Guras	Rhododendron arboreum
Haledo	NA
Jamuna	Syzygium cumini(L.) skeels

Jatamasi	<i>Naidostachys jatamasi</i>
Kalimuntae	NA
Kafal	<i>Myrica eculenta</i>
Kade jhar	<i>Randia telrasperma</i>
Katus	NA
Kimbu	<i>Coichliospermum religiosa</i>
Kurilo	<i>Garden asparagus</i>
Nigalo	NA
Pipal	<i>Ficus religiosa L</i>
Setojhorroo	NA
Sishnu	<i>Girardina palmate</i>
Suami	<i>Ficu Benjamina L. (Golden Fig)</i>
Timur	<i>Zanthoxylum armantum D C</i>
Titepati	<i>Artemisia indica willd</i>
Unue	<i>Dryopteri sp</i>
Utis	<i>Alnus nepalensis</i>