CLIMATE CHANGE, TOURISM AND LIVELIHOOD: A CASE STUDY OF MANASLU CONSERVATION AREA, NEPAL

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By

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LETTER OF RECOMMENDATION

This thesis entitled **"**CLIMATE CHANGE, TOURISM AND LIVELIHOOD: A CASE STUDY OF MANASLU CONSERVATION AREA, NEPAL" has been prepared by Mr. Anup K.C. under my supervision. I hereby recommend this thesis for examination by the Thesis Committee as a partial fulfillment of the requirements for the Degree of MASTER OF ARTS in ECONOMICS.

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APPROVAL SHEET

We certify that this thesis entitled **"**CLIMATE CHANGE, TOURISM AND LIVELIHOOD: A CASE STUDY OF MANASLU CONSERVATION AREA, NEPAL" submitted by Mr. Anup K.C. to the Central Department of Economics, Faculty of Humanities and Social Sciences, Tribhuvan University, in partial fulfillment of the requirements for the Degree of MASTER OF ARTS in ECONOMICS has been found satisfactory in scope and quality. Therefore, we accept this thesis as a part of the said degree.

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ABSTRACT

With a special focus to study the impact of climate change in tourism and livelihood, this research was carried out in Manaslu Conservtion Area (MCA) of Gorkha district of Nepal. The study was done with the help of 76 household (HH) survey, 3 focus group discussions (FGD), 5 key informant interviews (KII) and by analysis of secondary data and literature. Regression model was used to assess, impact of tourism in livelihood and impact of climate change and tourism in livelihood.

Socioeconomic variables such as population (age, marital status, size of household), livestock holding status, land holding status, education and occupation of the HH were affecting the living standard of people and tourism participation. Climate change impact was perceived as increase in frequency of landslides, increase in temperature resulting in faster melting of snow, unfavorable weather change phenomenon, snowfall in the month of May, decrease in agricultural productivity and economic instability affecting the livelihood of people. Number of visitors is increasing in MCA in recent years which might be due to the positive impact of climate change and publicity in national and international scenario. Physical capital, square of physical capital, tourism participation and income are positively significant with per capita HH consumption. It shows that, holding more land encourage tourism participation to earn more money which in turn positively affects the livelihood of the people. Climate change had insignificant impact on livelihood of the people in the study area at present.

There was significant impact of tourism in livelihood of the local people in MCA till the date. The scenario might be different if the climate change and its impact increases in the future. So, awareness and education programmes related to tourism, gender empowerment of women, advertisement and publicity on tourism promotion in national and international level, adequate subsidy and training on ecotourism, skill development trainings on handicraft and further research to identify the relationship between climate change, tourism and livelihood is recommended.

Key Words: *Climate Change, Tourism, Livelihood, MCA*

JEL Classification: *Q54, L83, D130*

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ACRONYMS AND ABBREVIATIONS

CO_2	Carbon Dioxide
CC	Climate Change
°C	Degree Celsius
DHM	Department of Hydrology and Meteorolgy
FGD	Focus Group Discussion
g/ cm^3	Gram Per Cubic Centimetre
FGD	Focus Group Discussion
GDP	Gross Domestic Product
GHGs	Green House Gases
HH	Household
IPCC	Intergovernmental Panel for Climate Change
KII	Key Informant Interview
MCA (P)	Manaslu Conservation Area (Project)
NTNC	National Trust for Nature Conservation
OLS	Ordinary Least Square
SPSS	Statistical Package for Social Survey
UK	United Kingdom
VDC	Village Development Committee

CHAPTER I
INTRODUCTION

1.1 Background

Global climate has always been changing naturally, but the changes in the last 50 years are dramatic and scientists attribute the change to human induced factors linked directly to increased levels of carbon dioxide (CO_2) and other green house gases (GHGs). On an average, the global temperature rose by 0.74°C over the last hundred years (1906-2005), with more than half of this rise, 0.44°C, in the last 25 years. Eleven of the twelve years between 1995 and 2006, rank among the twelve warmest years since 1850 (IPCC, 2007). According to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC, 2007): "Most of the observed increase in global average temperatures since mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations".

Major parts of the Hindu Kush Himalayan area are undergoing warming trends and annual mean temperature is increasing at the rate of 0.01°C/yr or more. In contrast, the Higher Himalayan data from Nepal over the period from 1977-1994 showed an increase in temperature of up to 0.06°C per year, which is greater than the global trend (Shrestha et al., 1999). Eastern Nepal and eastern Tibet show relatively greater warming trends (greater than 0.02°C per year) (Shrestha & Devkota, 2010). The warming trend was more evident during the winter months (December– February), when it was about 0.015°C per year higher than the annual rate, and at higher altitudes (Singh et al., 2011). Warming in the Himalayas is demonstrated by the increased rate of glacial recession and the resultant formation of new glacial lakes in the Higher Himalayas. The number of extreme precipitation events, like heavy rainfall and severe storms appears to have increased, and there is some indication that there has also been an overall increase in precipitation, although the confidence in these estimates is lower than for temperature (Singh et al., 2011).

Climate and Tourism have a very close relationship, and this relationship is even more pronounced for coastal tourism, mountain tourism and nature-based tourism (Moreno, 2010 as cited in Rayamajhi, 2012). Climate Change had impact on tourism through

increased stresses placed on environmental systems such as sea level rise on small island states like Maldives. Climate change is expected to increase the risk of illness in several parts of the world and consequently discourage tourism. More frequent periods of extreme heat will cause discomfort in trekking and winter tourism may also be affected (Viner & Agnew, 1999). For the global tourism industry, climate change brings more risks than opportunities. There will be regional and seasonal shifts in tourist flows, resulting in both winners and losers. Especially for the poorer countries, which are putting great hopes on tourism as a driver of development, climate change will principally bring additional burdens. Negative climatic consequences always have particularly serious effects if climate-sensitive tourism has major economic importance (Ehmer & Heymann, 2008).

Most of the nature-based tourism activities in the Himalayas are weather-sensitive. For example, rain and foggy conditions significantly decrease the quality of the trekking experience in the Himalaya (Nyaupane & Chhetri, 2009 as cited in Rayamajhi, 2012). Tourists might change the travel pattern in the future or may be even the destination if weather continues to disappoint them (Rayamajhi, 2012). The perceived change in temperature and hence the attractiveness of the mountains could have some influence in tourists' decision in the future. However, immediate changes in their travel pattern solely due to increase in temperature don't look very likely.

In many parts of the world, tourism has contributed to the dual goal of poverty eradication and conservation. Conservation area, wildlife areas and national parks constitute a significant market for tourism based on natural resources and local culture. These areas are also home to remote villages that sustain themselves on subsistence agriculture and forest resources. The co-existence of nature with impoverished communities offers an opportunity for pro-poor tourism. Tourism can support livelihood diversification, which is particularly important in remote areas. There is clearly a market for 'responsible' tourism that shows concern for the poor (Guha & Ghosh, 2007).

Trekking and mountaineering are major tourism activities that have helped uplift thousands of mountain people out of poverty. Every year, tourism generates employment for youths as mountain guides and porters, most of whom have very less income from

agriculture. In addition, trekking and mountaineering create opportunities for enterprise generation through the operation of tea houses and lodges along the trails (Sherpa, 2006). Due to the unfavorable climate change, there is impact on tourism industry which is one of the main sources of income to enhance the livelihood of the rural people. Untimely and high intense rainfall and snowfall had caused serious threat to the mountaineers, trekkers and travelers. It is difficult to complete the visit in a preplanned time for the tourist as that happened recently in Sagarmatha region. Bad weather had stopped flights for several days and caused economic and other social problems to the tourists (Kantipur, 2011). Tourists will be demotivated to travel due to the adverse climate change phenomena. Thus, it will have adverse impact on tourism in the long run. Also impact on tourism industry might affect the livelihood pattern of the local people who depend on tourism for survival. It is necessary to apply mitigation and adaptation strategies to combat climate change.

1.2 Statement of the Problem

Climate change had been one of the hot issues throughout the world. It had impact on different sector of environment including tourism. Because of the importance of weather and environment to leisure demand, tourism is one of the sectors most likely to be affected by climate change (Rayamajhi, 2012). Despite significant growth in research on tourism and climate change, there are considerable gaps in research regarding tourism and climate change in specific regions like Nepal. Most of the published researches are based on coastal tourism and the remaining studies which are based on mountain tourism focus explicitly on skiing tourism. In Nepal, very little study has been done about relationship between tourism, livelihood and climate change. Only few existing studies include stakeholders as the basis of study for assessing the impact on livelihood of the people.

1.3 Research Objective

The broader objective of this study is to identify and quantify impact of climate change on tourism and livelihood of the people in MCA.

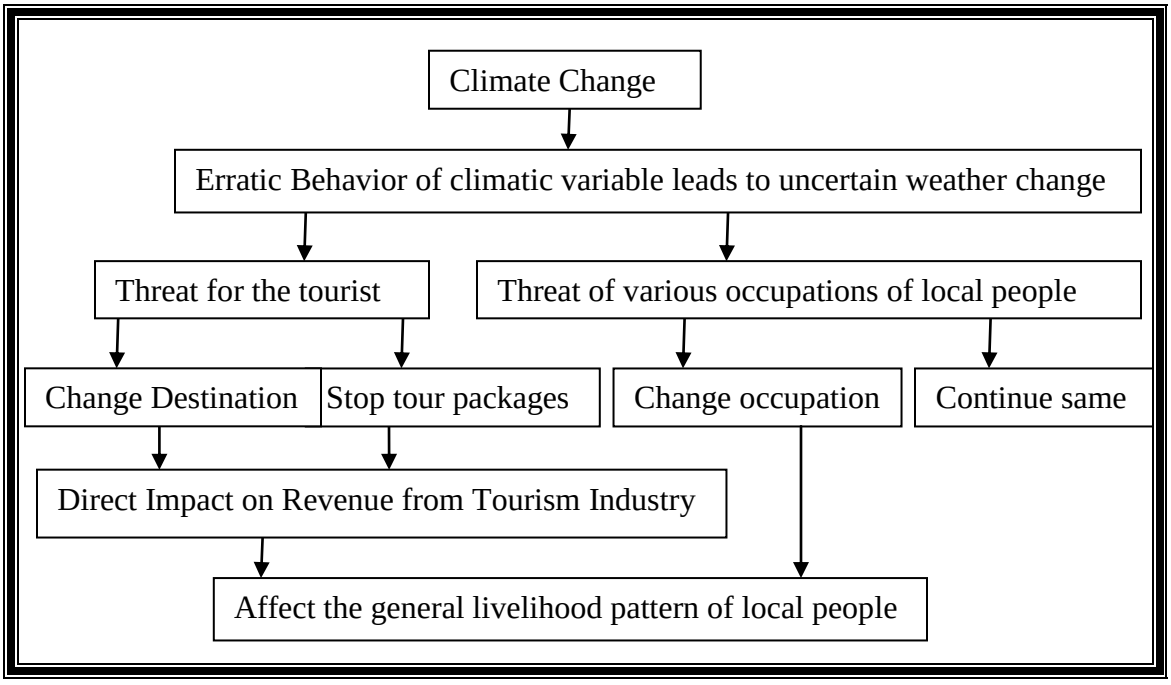
Specific objective of the research are as follows:

i. To compare and contrast the socioeconomic status of the sampled household.
ii. To assess the perception of local people towards climate change.
iii. To assess the relationship of climate change and tourism.
iv. To study the relationship of tourism and livelihood of the people.
v. To assess the relationship of climate change, tourism and livelihood.

1.4 Conceptual Framework of the Study

Climate change brings uncertain change in weather and threatens the tourism industry and other occupations of the people. Due to the threat in tourism industry, either tourist will change destination or stop tour packages. It will have direct impact on tourism. Due to threat in various occupations of local people, either people will change occupation or continues with the same. It will affect the general livelihood pattern of the local people.

Figure 1.1: Conceptual Framework of the Study



Source: *Constructed by author himself*

1.5 Rationale of the Study

As, Manaslu Conservation Area (MCA) lies in Hilly and Himalayan region of Nepal, the income from agriculture is scarce due to scarcity of productive land and inadequate access to irrigation. On the other hand, tourism might be a major economic activity

providing livelihoods to poor people. Climate change had been one of the hot issues in Nepal causing adverse impact on different sectors due to its topography and intense geographical variation. It might have adverse impact on Tourism and livelihood in MCA. There is a need of study to find whether climate change had impact on Tourism and Livelihood in Nepal especially in MCA. Today, the Government has identified tourism as a strong sector, contributing significantly to socioeconomic development as well as Gross Domestic Product (GDP). So, this study might help government and policy makers to make adequate policy to cope with climate change and its impact on tourism and livelihood in this area. It will help in balancing the economic condition of the country by increasing the revenue from tourism industry.

1.6 Scope and Limitations of the Study

The scope of the present study is to conduct the research in MCA in Gorkha district of Nepal. It includes the field data collection and review of literature and available maps. The area of the research covers the assessment of socioeconomic variables affecting tourism and livelihood and impact of climate change on tourism and livelihood. Based on the collected data dissertation was prepared.

During the research work, there were some limitations which are expressed as follows.

- The study was only possible to focus in MCA on trekking route and Lho and Samagaon VDC of Gorkha district.
- There was limited time available to conduct this research work.
- There was limited resource available to do the field work as expenses were very high.

CHAPTER II
LITERATURE REVIEW

Some of the literatures related to climate change, tourism and its impacts on livelihood were reviewed and documented as follows.

2.1 Climate Change Perception

Ishaya & Abaje (2008) study examines the way indigenous people in Jema'a Local Government Area of Kaduna State perceive climate change by questionnaires. Findings revealed that indigenous people in the study area perceived that the climate has been changing over the years due to diverse human activities. The threat of climate change is more on health, food supply, biodiversity loss and fuel wood availability.

Bhusal (2009) research was carried out in Lumle and Ghandruk VDC of Kaski district. The analysis shows that 90 percent respondents perceive the temperature has increased and 97 percent said they are experiencing unpredictable rainfall patterns since last 10 years. More than 50 percent respondents explored that late start of monsoon, incidents of drought has increased; hail storm occurs abnormally, wind flow pattern is getting warmer, decreasing water sources. The result revealed that 92 percent of the local people interviewed perceived long-term changes in temperature. While, most of them (90 %) perceive the temperature has been increased. Only 2 percent noticed the contrary, a decrease in temperature. 97 percent of the respondents observed an unpredictable rainfall patterns over the past 10 years, and 3 percent noticed a predictable and constant rainfall patterns. Almost 72 percent of the respondents said that the incidents of drought has been increasing and link it with the untimely and unusual rainfall patterns over the past few years.

DOE (2009) did a study on respondent's attitudes towards climate change, its concern and impact on lifestyle in Northern Ireland through questionnaire. A high proportion of respondents thought climate change was caused by human activity and natural processes together (58%). A small number of respondents did not believe in climate change (4%). Over half of respondents (57%) were concerned about the possible impacts of climate change. Nearly a third of respondents (31%) agreed that changes to the climate have had

a direct impact on them with 48 percent of respondents disagreeing with this statement. The top five main concerns from respondents about potential effects of climate change in Northern Ireland were damage to natural environment and wildlife (55%), increased flooding (54%), a more polluted atmosphere (49%), an increase in the number of severe weather events (46%) and danger to public health (43%).

Chaudhary et al. (2011) examined the perceptions of local communities about climate change and its impacts on ecosystems, biodiversity, agriculture and livelihoods in the Kangchenjunga Himalayas region based on surveys conducted in 576 households, focus group discussions, key informant interviews and direct observations. The results show that people in the Kangchenjunga Himalayas region have considerable knowledge of climate change and its effects on the weather, ecosystems, biodiversity and agriculture. 84.4% of the people believe that the weather is getting warmer and nearly 78.6 percent believe that onset of summer and monsoon has advanced during the last 10 years. More than 40 percent of local people also claim that droughts are more frequent than before. It also shows that more than three-fourths of the local people believe that water sources are drying up and 60.2 percent of them feel that there is less snow in the mountains compared to the past. A total of 56.8 percent of the people experienced early ripening or maturity of their crops and vegetables. 68.8 percent of the people have been observing mosquitoes in their villages for the last 4–5 years, mainly in lower hills.

Dahal (2011) conducted a study on Sano Sirubari VDC of Sindhupalchwok district during the period of February to September, 2011 with the help of interview survey, key informant interview and focus group discussion. Local communities experienced increasing warm days and shortening cold winter days. The pattern, intensity and amount of rainfall also changed, resulting in the scarcity of water. People started feeling scarcity of water for irrigation and drinking. Climate change was affecting agriculture and production of main crops and cash crops has decreased. Different invasive species, pests and insects were increasing in farm. Many species of main crops such as rice, maize and millet species are in threat. Livestock are also affected from climate change, because of less germination of fodder. Number of livestock had decreased, resulting in declining incomes from livestock and related activities. Community members had experienced

different new diseases resulting from including mosquitoes. Different health problems were increasing; especially women and children have been affected from itching problem, skin diseases, menstruation cycle, uterus infection (disease) and eye infection problem. On the other hand, flowering time of different species including *Shorea robusta*, Aamala, maize etc was changed and so the germination, harvesting and maturing times of different crops had changed. Income level from agriculture and livestock had decreased, so people are separating from their traditional occupation, way of life and they are seeking alternative professions.

Macchi et al. (2011) found that climate related changes are already having severe impacts on people's livelihoods, particularly those that are highly dependent on agriculture and animal husbandry related activities. Water scarcity, overabundance, drastic reductions in yields, increases in crop pests and disease, health issues and increased workloads are climate change related problems.

Pokharel (2011) carried out research in Danchhi VDC of Kathmandu District, with a questionnaire and focus group discussion to obtain information about impacts of climate change. Respondents experienced all the Hazards due to climate change. Frequent floods with high intensity resulting from the irregular and intense rainfall, drought for long period, winter rain with snow and hailstone, or no rain during winter, were hazards experienced by the farmers.

Piya et al. (2012) did a study on Perceptions and Realities of Climate Change among the Chepang Communities in Rural Mid-Hills of Nepal with the help of questionnaire survey. Most of the respondents (36.7%) feel that the total rainfall has decreased; the next majority of respondents (23.5%) feel that rainfall is unpredictable in terms of quantity; there are also quite many respondents (21.3%) who feel that rainfall is coming later than the usual time. There are around 13.2 percent to 16.7 percent of respondents who do not perceive any changes in rainfall. Majority of the respondents have noticed the rising summer temperature (47.5%) and 9.5 percent of the respondents perceive cooler summer. 21.8% perceive that winter is becoming colder while nearly equal percentage of the

respondent (22.6%) perceive that winter is getting warmer. There are also a significant proportion of the respondents (38.5%) who do not perceive any changes in temperature.

2.2 Climate Change and Tourism

Pandey et al. (1995) did a case study based on a research design developed by experts on culture and tourism in a meeting held in Cipanas, West Java, Indonesia from 22-24 July 1992. This approach reduces the cultural heritage and the environmental assets to an economic commodity minimizing or sometime completely ignoring their socio-cultural values. The zeal of collecting mementoes, particularly from the archaeological sites, has also led to vandalism of many sites. Sometimes it also destroys the ties that bind people to their faith, religion and aesthetics. In the wake of accumulation of restaurants, bars, discos and other entertainments come disturbing public behavior, drunkenness, vandalism, crime, indecency, etc. The youth in many cases emulate the visitor's behavior and social conflicts brew. On the other hand tourism, by bringing people of different cultures together, provides a direct contact between them and thus serves as a powerful means of diffusion of world cultures. It provides an opportunity of friendly and peaceful dialogue leading to better understanding between people and nations.

Braun et al. (1999) intended to demonstrate the usefulness of a psychological experimental approach in researching the underlying processes of socio-economic impacts of the effects of an eventual climate change in the field of tourism. A pilot study was designed and carried out in German Coast at the North and Baltaic Seas in order to develop a method to measure the sensitivity of destination choice to climate change effects and to gain first ideas of whether and how destination preferences will probably change. According to the data, climate change can influence the preferences for vacation destinations. With respect to the North German coastal region, this effect is rather a negative one. Under the climate change conditions presented in the scenarios, possible tourists are less eager to travel there than under today's conditions. It will not be easy for the local and regional tourism industry to reduce negative effects or to use positive effects to a certain extent by appropriate action.

Viner & Agnew (1999) reviews the impacts of climate change for a wide range of international holiday destinations visited by UK tourists. The impacts of climate change on tourism are likely to manifest themselves in a number of different ways according to local conditions. Many of these impacts will develop indirectly through increased stresses placed on environmental systems. The most serious impacts will result from the effects of sea level rise on small island states. The Maldives, which are an increasingly popular tourist destination, are particularly vulnerable to sea level rise. Climate change is expected to increase the risk of illness in several parts of the world and consequently discourage tourism. More frequent periods of extreme heat will cause discomfort in many resorts of the Eastern Mediterranean, where the number of days above 40°C is estimated to increase. Decreasing cloud cover in Australia will increase exposure to the sun's harmful rays and malaria is likely to re-emerge in Spain, the most popular destination for tourists from the UK. Winter tourism may also be affected, as the Alps and other skiing destinations experience less snowfall and shorter skiing seasons. The attraction of many holiday resorts is the prospect of guaranteed sunshine and heat. A generally warmer climate will benefit those holiday destinations such as the UK where summer weather conditions are at present highly variable. With warmer weather a higher proportion of UK residents may be encouraged to holiday at home. We may witness not only an expansion in the domestic market, but an expansion in the inbound international market as the UK develops a more Mediterranean climate.

Shah & Gupta (2000) found that alongside many negative impacts associated with tourism, there are also potential gains for the host communities in Southeast Asia and the Himalayan region of western India and Nepal from mass tourism. Tourism can affect the natural resources of the area positively and negatively and affect livelihoods of many of those who are not directly engaged in tourism. In any locality, strategies need to be designed to maximize gains for local communities, while ensuring that other stakeholders also have an interest in promoting such strategies. Various sections within the host community and all the other important stakeholders should play an active role in designing the process leading to the formulation of the strategies and in the process itself.

Ehmer & Heymann (2008) assessed whether climate change will cause positive or negative effects in the countries with the aid of a scoring model. This model was based on four parameters, firstly, direct climatic effects; secondly, substitution effects resulting from climate; thirdly, regulatory burdens and consequent geographical substitution effects; and fourthly the possibilities each country has to adapt to climate effects. The parameters were assessed with different weightings and broken down into subcategories to differentiate better between the countries. The time horizon was 2030. An interesting factor was that, up to 2030, despite the completely negative effects of higher temperatures in the Mediterranean region, France and Italy will benefit slightly as a result of their diversified tourism structures, Switzerland will also be one of the gainers, in particular due to its high snow reliability in comparison with the other Alpine countries, while Austria will tend to lose. Outside Europe, most countries will suffer from climate change, albeit to differing degrees. Climate change predominantly means additional burdens for all the poorer countries in our investigation that are putting great hopes on tourism as a driver of development. Canada, New Zealand and with reservations the USA are the only three further countries outside Europe whose tourism industries will be on the winning side.

Sem & Moore (2009) found that climate change had impact on the social and economic fabric of life in small islands, affecting key sectors such as tourism and agriculture, and placing critical infrastructure at risk. The size and relative isolation of the islands will make them feel the effects of climate change more than other countries. Indeed, climate change will place the viability and very existence of many island states at risk. The Least Developed Countries and Small Island Developing States are at the frontline of climate change effects, but they remain on the margins of the current debate on climate change. Their contribution to greenhouse gas emissions is minute, and that climate change would continue even with the most optimistic global reductions in greenhouse gas emissions.

Lama (2010) study on Lower Mustang shows that people perceive warm and dry winter. The positive impact is that winter is no longer a barrier for trekking tourism in lower Mustang. The negative impacts of warmer winters are the loss of the natural/aesthetic beauty of the place and reduced water availability. Decreased snowfall in winter meant

mountains left with patchy thin cover of snow would lose the natural and aesthetic beauty of the mountains. From the tourism service and activities viewpoint, water scarcity is affecting the stakeholders operating hotels in villages such as Muktinath, Kagbeni, Puthang, Marpha and Lete. Hotel owners from Marpha and Puthang expressed concerns over the drying up of sources of drinking water in the existing spring and the burden of bringing water from the new source. Camping activity in the high mountain valleys has also been affected by reduced water availability. Drought is perceived to have resulted in an increased incidence of forest fires in the area.

Moore (2011) had done an Economic assessment of the Impacts of Climate Change on Tourism in Barbados. He found that climate change policies in source countries may reduce tourism mobility. Recent policy in UK has increased price of flights to Barbados for family of four by £240. Mid scenario suggests reduction in tourist arrivals by 6.3 percent by 2020. Worst case scenario suggests reduction could be as much as -40 percent by 2050.

Simpson et al. (2011) found that some Caribbean destinations may become "too hot" for tourists during some seasons. Under climate change scenarios, some destinations exceed the "unacceptably hot threshold" during the summer. As temperatures increase, demand for winter getaway holidays is anticipated to decline. If climatic conditions in other destinations such as the Mediterranean improve sufficiently, they may become more competitive with the Caribbean. Climate change will have an impact on the operating costs of tourism operators, such as insurance, heating and cooling costs, pest management, and the need to augment the water supply for drinking and irrigation needs. Annual average losses from wind, storm surge, and inland flooding are estimated to be as high as 6 percent of GDP in some countries, and climate change has the potential to increase these risks 33–50 percent by 2030. Sea level rise of 1 meter is projected to put 266 out of 906 tourism resorts and 26 out of 73 airports in the Caribbean at risk of inundation. An estimated 49 percent of major tourism resorts in CARICOM would be damaged or destroyed by combined SLR and storm surge and SLR-enhanced erosion, as many lack extensive coastal protection in order to preserve aesthetics of natural beach areas and views to the sea.

Subedi & Chapagain (2011) did a study on Upper Manang with secondary data. From 2002 to 2006, the number of tourists visiting the Manang valley decreased. The annual flow figure of about 14,000 went down to less than 10,000 in 2002. This figure increased to 11,000 the following year but again the downward spiral started, reaching the lowest in 2006. This decrease is not unique to Upper Manang but a common feature of Nepal as a whole. During these years, the total trekkers in the three major routes, namely Annapurna, Everest and Langtang decreased drastically from some 100,000 in 2001 to 67,000 in 2006. This being a reflection of the conflict, the figure increased after the Comprehensive Peace Accord between the government and the Maoist rebels in 2005. The number of trekkers in Upper Manang reached more than 14,192 in 2007, the highest over the last nine years.

Rayamajhi (2012) explores the relationship between tourism and climate change. It takes the perceptions of the stakeholders in the tourism sector, mainly the lodge-owners, guides and tourists in the Annapurna Trekking Trail. Sixty nine percent of the lodge-owners and guides said that there have been changes in the tourism season. In some years, the season started earlier and in some years later. Forty nine percent of the respondents said that the change in climate had relation with the work they did. Thirty four percent perceived no relation, while 17 percent of them were not sure if the changing climate had any relation with their work. Despite the change in climate, as perceived by the stakeholders, and the shift in tourism seasons that varies every year, 62.9 percent said that the number of tourists has been increasing. The lodge owners and guides said that climate change is imminent, 83 percent believed it would have an impact on Nepal's tourism industry. They said that impact would mostly be negative which might affect the number of tourist flow in the area. Change in temperature has not been so significant to the extent of causing discomfort to the tourists. Forty six percent of the lodge-owners and guides in the Annapurna area said that increase in temperature would not produce significant changes on tourists' level of comfort as the temperature rise was not that significant. The rise in temperature has not been so significant as to make people feel uncomfortable; it does not seem to be a cause of alarm for tourists. It was found that though the erratic rainfall directly hampered the lodge-owners' business. Decrease in snow cover, glacial melts and the rise in temperature has not been too significant to have an impact on their business.

While risk of increased intensity of rainfall, landslides, and floods among others would prevent them from visiting in the future, other results of climatic changes like glacial melts and hotter temperatures would not bother tourists much. Though a little temperature rise may not affect the trekking tourist significantly.

Scott (2012) did a study on tourism in Caribbean and found that climate change shifts in travel patterns and cause more spending in temperature nations and less spending in warmer nations. Shifts in tourism from North Europe to Mediterranean and the Caribbean, North America to the Caribbean are occurring. Increase in length of stay is increasing revenues and reducing average carbon/ ecological footprint per trip. Research needs to be done on tourists' propensity to pay to offset their emissions or to reduce the impact of tourist related travel. Opportunity exists for the Caribbean to develop low-carbon products. Perception of CC impact is influenced by the nature of media coverage in speculation and misinformation about the impact on CC.

2.3 Tourism and Livelihood

Guha & Ghosh (2007) study examines the contribution of tourism towards improving the livelihoods of local people in a remote island village of the Indian Sundarbans. Households entering into tourism-related occupations have significantly raised their living standard compared to other non-participating households. The participating households distribute the seasonal inflow of tourism money over their year-long expenditures. The additional money from tourism enables the households to consume over and above the bare necessities as revealed by the fact that they have enhanced their expenditure on non-food items proportionately more than on food items. The trickle-down effect of tourism money to non-participating households by intra-village transactions is statistically insignificant as such households show no significant increase in their expenditures by virtue of their location in the study village.

Adhikari & Fischer (2008) study investigates the socio-economic impact of tourism in two wards of Ghandruk VDC, western Nepal based on household surveys and secondary data, office records, informal and formal interviews and direct observation. Sustainable tourism is able to enhance nature conservation by opening up new opportunities. The

study suggests that there is a trade-off between economic benefits and environmental and social-cultural costs, which requires a good balance to implement the concept of ecotourism, which boons for forest conservation, livelihood, and community development.

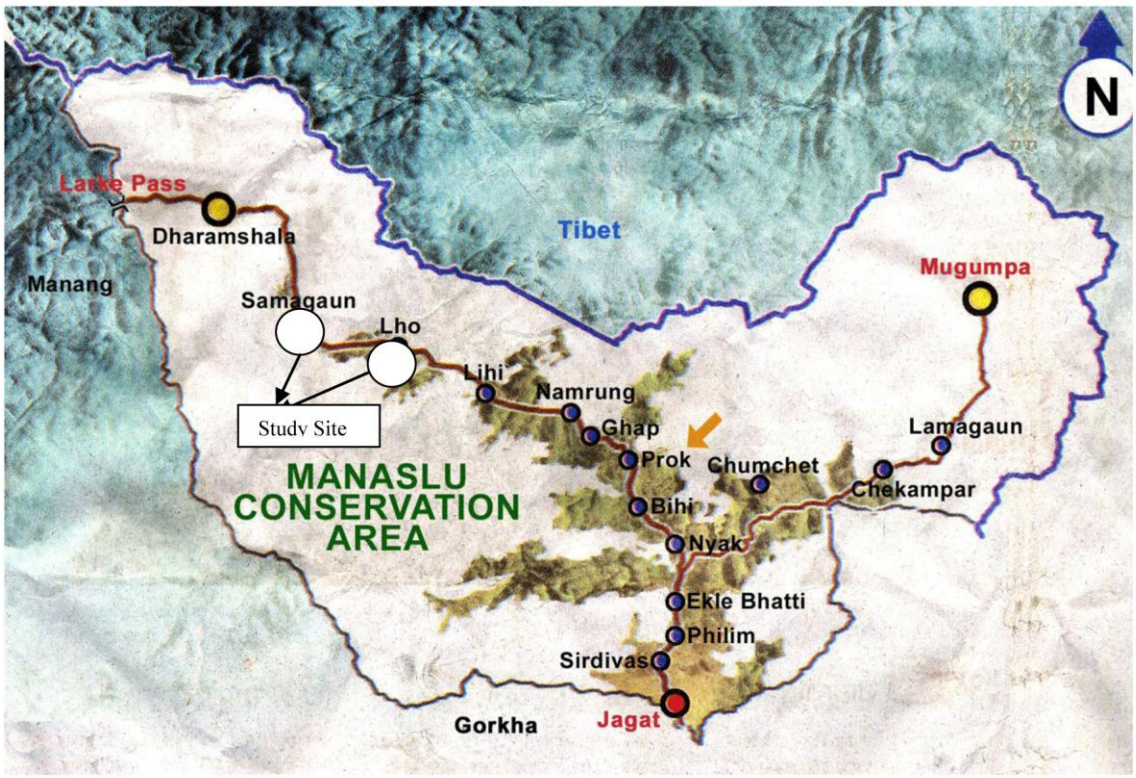
Farooq et al. (2012) did a study on the Impact of Tourism on Local Livelihood in Galliyat, District Abbotabad with the help of questionnaire survey. Physical Capital has significant effect on household per capita consumption with p=.0.002 (< 0.005), while the square of physical capital has positive and significant effect on household consumption with p=0.012 (< 0.005). This means that household consumption is dependent on physical capital. Households with more physical capital have higher consumption. The productive human capital has positive and significant effect on consumption with p= 0.000 (< 0.005). This means that households with more number of employed persons have higher consumption. Education has positive but insignificant effect on household consumption with p=0.177 (> 0.005). Another explanatory variable is the household size which has negative but significant effect on consumption with p= 0.000 (< 0.005). Square of the household size has positive and significant effect on household consumption with p=0.000 (< 0.005). Livestock is positive but insignificant with p=0.551 (> 0.005). Tourism participation has significant and positive effect on household consumption with p=0.028 (< 0.005). This reflects that those household members who participate in tourism related activates, their consumption will be greater than those who are not participating in tourism related activities.

CHAPTER III
METHODOLOGY

3.1 Study Site Description and Rationale for Selecting the Study Area

The study was carried out in trekking route from Machhakhola to Samagaun as well as in Lho and Samagaun VDC of Gorkha district in Manaslu Conservation area as shown in figure-1. It was declared on December 28, 1998 as the conservation area of Nepal. It is the second conservation area under National Trust for Nature Conservation (NTNC) management.

Figure 3.1: Map of the Study Site



Source: *NTNC, 2012*

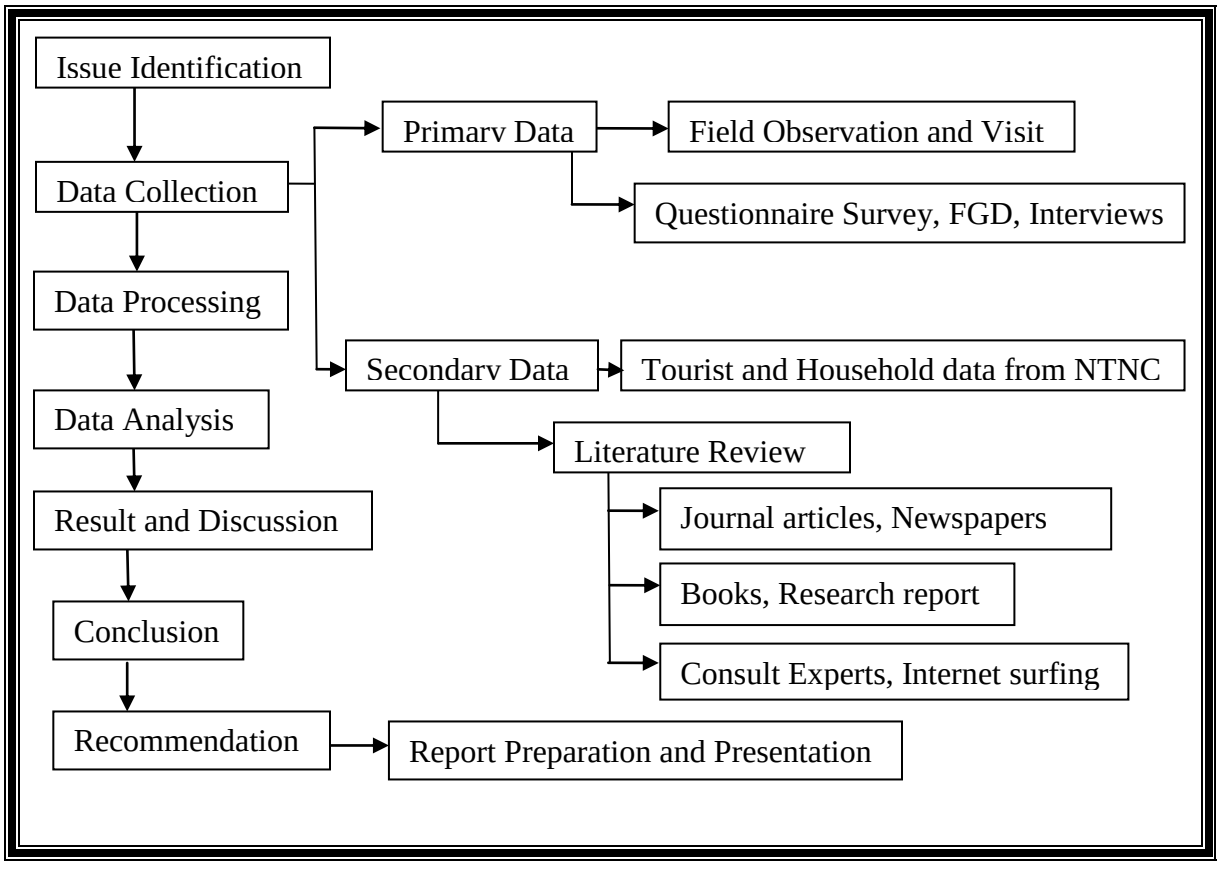
Manaslu, a mountainous region in northern part of Gorkha district, has a fragile but diverse natural resource base and a rich cultural environment. It is one of the trekking destinations for national and international tourist. It lies on mountain region of Nepal which is much affected by climate change and its impacts. Also the livelihood of people

is affected by tourism in this area. So, assessment of climate change and its impact on tourism and livelihood is suitable in such a mountainous region like Manaslu.

3.2 Research Design

For this study, primary data was collected from observation, HH Survey, KII and FGD. Secondary data was collected by literature review from journals, books, newspapers, research reports, expert consultation and internet surfing. The collected data were processed with the help of Microsoft Excel 2007 and Statistical package for Social Survey (SPSS) 16 software. Later on, the data were analysed and results, discussion and conclusion were compiled to form a report.

Figure 3.2: Research Design



Source: *Constructed by author himself*

3.3 Nature and Sources of Data

Primary as well as secondary data was collected by applying following techniques.

Primary data was taken from questionnaire survey, FGDs and key informant interviews on their livelihood, economic activities and their perception about climate change.

Secondary data of tourist and demographic data of study area was taken from NTNC. Other relevant information was taken from different books, journals, and newspaper and research report during literature review.

3.4 Sampling Technique

Random sampling method was used for questionnaire survey among the participant household in tourism business and non tourism business. Adequate number of sample was taken according to the study area and size of household after getting general information from MCAP as shown in table-1.

3.5 Data Collection Techniques/ Instruments

Questionnaire survey, focus group discussion and Key Informant Interview were done for primary data collection. Literature review and secondary data related to tourist visited and household data was collected for secondary information.

3.5.1 Primary Data Collection

Questionnaire Survey: In order to estimate the contribution of tourism-income to the livelihood of local households, a detailed income generation and consumption expenditure survey of households was undertaken in the study area. Also, information about perception and their experience about the climate change and its impacts on tourism were gathered. The revenue from all other income related activities such as agriculture, livestock and family income which has direct impact on livelihood of people was calculated with the help of questionnaire survey.

Table 3.1: Number of household surveyed with their percentage

Studied site/VDC	Total Household	No. of HH surveyed	Percentage of sample
Lho	229	23	10.04
Sama	166	23	13.86
Tourism Business outside Lho and Sama VDC after Machhakhola	58	30	51.72
Total		76	

Source: *Field Survey 2012*

Focus Group Discussion: Focus group discussions (FGDs) were conducted for the sample selection and verification of available information from questionnaire survey. 3 FGDs (with youth, local leaders and women group) and 1 general meeting were conducted during the field visit in Sama VDC. Also, tourist related information, climate change perception, tourism and its impact on livelihood and impact of climate change on tourism and livelihood related information was gathered during FGD.

Key Informant Interview: To gather the important information on climate change perception, tourism and its impact on livelihood and impact of climate change on tourism and livelihood related information, Key Informant Interview (KII) was conducted during the field visit. 3 KII were conducted in Sama VDC and 2 KII in Lho VD**C.**

3.5.2 Secondary Data Collection

Demographic and economic data was taken from CBS and NTNC. Tourist related data of the study area was collected from NTNC. Other information on climate change, tourism and livelihood was taken from IPCC and ICIMOD publications, econometric books, SANDEE journals, Climate Change and Tourism journals, Nepal Tourism and Development Review journals, other international journals, unpublished thesis, etc during literature review.

3.6 Data Analysis, Tools and Techniques

The qualitative and quantitative information about socioeconomic components collected from HH Survey was analyzed graphically in Microsoft Excel 2007 and SPSS 16 software. The qualitative information about climate change perception collected from HH survey was analyzed graphically in SPSS 16 software.

Per capita household consumption (PCHC) depends upon productive human capital (PHC), household size (SH), square of household size (SH^2), education (ED), physical capital (PC), and square of physical capital (PC^2), livestock (LS), tourism participation (TP) and income (IC).

In my sample household, it can be hypothesized that PCHC depends positively to ED, PC, PC^2, LS, TP and IC and negatively to SH, SH^2. It can be expressed as follows:

$PCHC = f\ (PHC, SH, SH^2, ED, PC, PC^2, LS, TP, IC)$…….. (3.1)

Equation 3.1 can be specified as

$PCHC=\beta_0+\beta_1 PHC+\beta_2 SH+\beta_3 SH^2+\beta_4 ED+\beta_5 PC+\beta_6 PC^2+\beta_7 LS+\beta_8 TP+\beta_9 IC+\varepsilon$… (3.2)

Where;

β_0=Intercept, β_s=Partial Slope Coefficients, s= 1, 2…9

ε= Error

(Farooq, et al., 2012) also examined similar model (3.1 & 3.2) but without using income in the context of Abootabad, Pakistan.

To assess the relationship of tourism, livelihood and climate change, climate change perception (CCP) component was added in equation 4.2 and expressed as follows.

$PCHC = f\ (PHC, SH, SH^2, ED, PC, PC^2, LS, TP, IC, CCP)$…….. (3.3)

Equation 3.3 can be specified as

$PCHC=\beta_0+\beta_1 PHC+\beta_2 SH+\beta_3 SH^2+\beta_4 ED+\beta_5 PC+\beta_6 PC^2+\beta_7 LS+\beta_8 TP+\beta_9 IC+\beta_{10} CCP+\varepsilon$..(3.4)

Where;

β_0=Intercept, β_s=Partial Slope Coefficients, s= 1, 2…10

ε= Error

The degree of relationship existing between dependent and independent variables is shown by the coefficient of determination (R^2). Hence, in each case, the coefficient of determination (R^2) had been calculated in order to test the explanatory power of independent variables. After estimating the regression parameters, R^2 was used for judging the explanatory power, which measures the dispersion of observations around the regression line. It was essential because the closer the observations to the line, the better explanation of the variations of Y (dependant variable) by the change in the explanatory variables. Thus, in over all, R^2 had been computed to show the percentage of the total variation of the dependent variable that is explained by the independent variables. The formula to derive R^2 is mentioned below.

The model with K explanatory variables

$$R^2 = \frac{\sum \hat{y}_i^{\,2}}{\sum y^2} = 1 - \frac{\sum e^2}{\sum y^2} = \frac{\hat{a}_i \sum yx_i}{\sum y^2} = \frac{\hat{a}_1 \sum yx_1 + \hat{a}_2 \sum yx_2 + ... + a_k \sum yx_k}{\sum y^2} \quad \text{..... (3.5)}$$

Where, $y = Y - \bar{Y}$, $x = X - \bar{X}$

The small sample test, t-test, was performed in order to identify the statistical significance of an observed sample regression coefficient and the formula for calculating the value is:

$t = \hat{a}_i / SEa_i$

Where, $\hat{a}i$= estimated value of a_i,

SE ($\hat{a}_i$) = standard error of $\hat{a}_i$ or $\sqrt{\mathbf{var}\,\hat{\mathbf{a}}\mathbf{i}}$

F-test was used to measure the overall significance of the estimated regression, which is also a test of significance of R^2 because these two vary directly. When $R^2 = 0$, F is zero and when $R^2 = 1$, F is infinite. That is to say, larger the R^2, the greater the F value. Thus, large value of F-test implies that the overall significance of the estimated regression is good. The F value can be computed as:

$$F = \frac{R^2/(k-1)}{(1-R^2)/n-k} \quad \text{..... (3.6)}$$

Where, k = Total number of parameters to be estimated.

n = number of observation

R^2 = coefficient of determination.

The standard error of regression line (estimate) is a measure of precision in the reduction of value of dependent variable based on the regression equation with the value of independent variable. So, it was used during analysis of regression model.

CHAPTER IV
RESULTS AND DISCUSSION

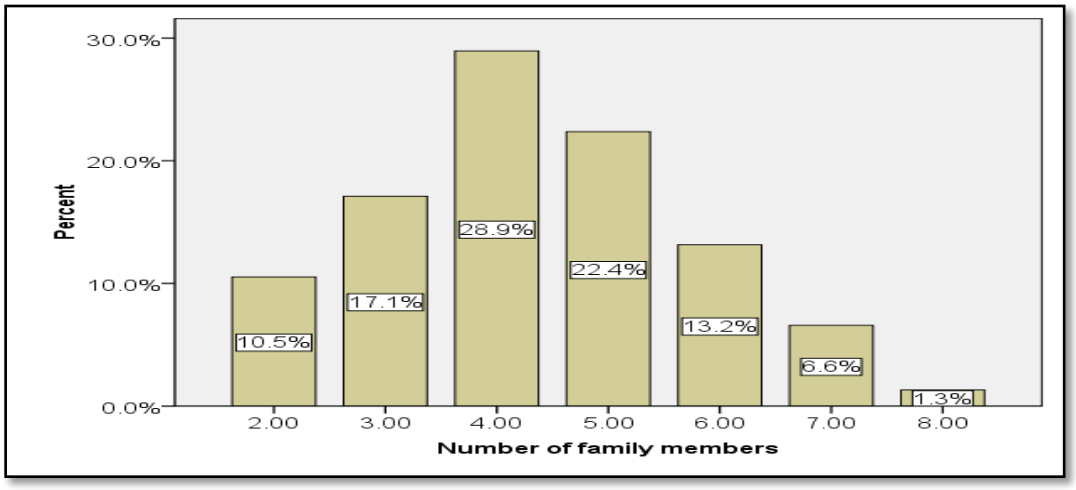
4.1 Socioeconomic Status of the Sample Households

Socioeconomic components such as household size, gender, marital status, education, occupation, land and livestock holding status were analyzed which were important in this study.

4.1.1 Household Size, Gender and Marital Status

During questionnaire survey, different questions related to the household size, gender and marital status was asked to the available respondent of the family. Seven different category of household size was constructed subjectively starting from smallest size of 2 members. There were six other groups in increasing order till the largest size of 8 members.

Figure 4.1: Number of Family Members



Source: *Field Survey 2012*

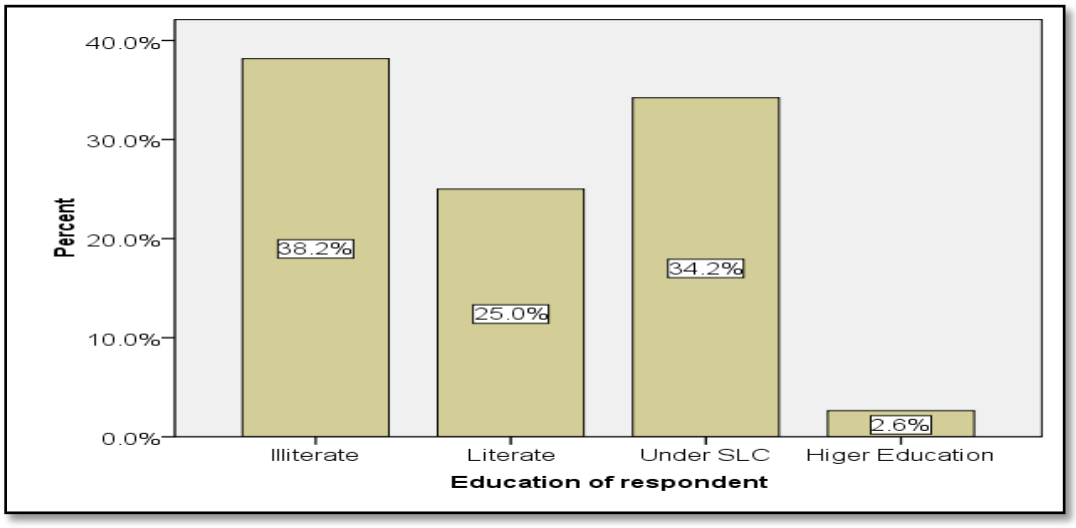
28.9 percent of household have 4 members in their family as shown in Figure-4.1. Very less (1.3%) household have more than 8 members in their family. About 10.5 percent of the households have 2 members in their family as they have been separated from their joint family. Gender wise, the respondent were 51.32 percent male and 48.68 percent female. About 89.5 percent respondent was married and 10.5 percent were unmarried. The average household size, male population and female population percentage at national level according to CBS (2012) was 4.88, 48.51 percent and 51.49 percent,

respectively. Both male and female are participating in tourism related activities as seen in field observation and household survey. There was more involvement of married adult people in the tourism business and their family member ranges from 2 to 8 members. The families having more members were easily conducting tourism business without employing supporting staff.

4.1.2 Education and Occupational Status

Questions related to education and occupation was asked to the respondents. Four different categories of education as shown in figure were constructed. Among the respondents, there were 61.8 percent literate and 38.2 percent illiterate as shown in Figure-4.2.

Figure 4.2: Education of the respondents



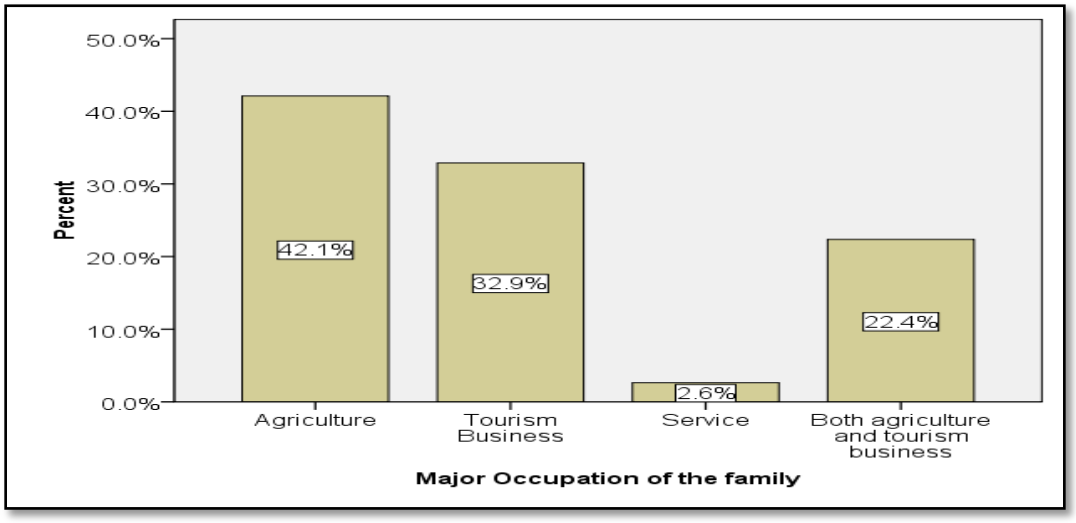
Source: *Field Survey 2012*

The literacy rate of the respondents was less than the national literacy rate of population (65.9 %) (CBS, 2012). There were very less people pursuing higher education. Many people used to send their children for lama education system in gumba because most of the people were following Buddhist religion. Many people were unable to pass SLC level of examination. As MCAP lies in mountain region of Nepal, schools and gumba were far from the residential area. But due to the facility of boarding in the school and gumba and more funding from the international and national agencies, students were attracted towards the school and gumba for education. So, literacy rate of young children was high

and old people were low as old people were deprived of education in the past. Literate people are seen more involved in tourism business than the illiterate people.

Four different major categories of occupation as shown in Figure-4.3 were constructed for analysis of occupation. As the study area lies in mountain region of Nepal, 42.1 percent households were involved in agriculture and 32.9 percent in tourism alone. About 22.4 percent people were involved in both agriculture and tourism. In the current study total respondents involved in agriculture was 64.5 percent which was less than CBS (2011) data (76 %). About 55.3 percent respondents were involved in tourism. During plantation and harvesting time, people were involved in agriculture and in other time they were involved in tourism business. But the main source of income was harvesting of Yarshagumba during April and May month of the year. Very less household involved in service indicates that the people in the study area depend directly on tourism and harvesting of Yarshagumba for sustaining their livelihood.

Figure 4.3: Major Occupation of the household



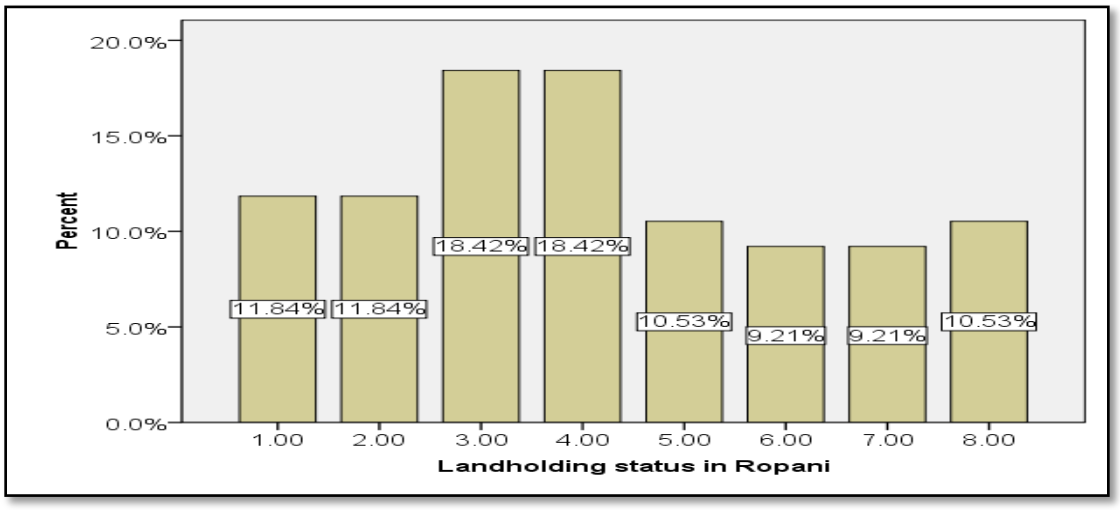
Source: *Field Survey 2012*

4.1.3 Land and Livestock Holding Status

Questions related to the land and livestock was asked to the respondents. Eight different category of land was constructed subjectively starting from smallest size of 1 ropani. There were seven other groups in increasing order till the largest size of 8 ropani. As the study area lies in mountain region of Nepal, people had very less private owned land for

agriculture and as a pasture. More households had owned 3 ropani and 4 ropani land as shown in Figure-4.4. People used to grow karu, millet, potato, onion and other green vegetables. The agricultural production from this land was very less which even do not suffice for 2, 3 months. There was very less irrigated land. The households owned 3.15 ropani of land on an average which was very less comparision to the study done in Dhading district. In Rana (2008), irrigated land was 4.39 ropani/ HH and unirrigated land was 3.99 ropani/ HH.

Figure 4.4: Landholding Status of household



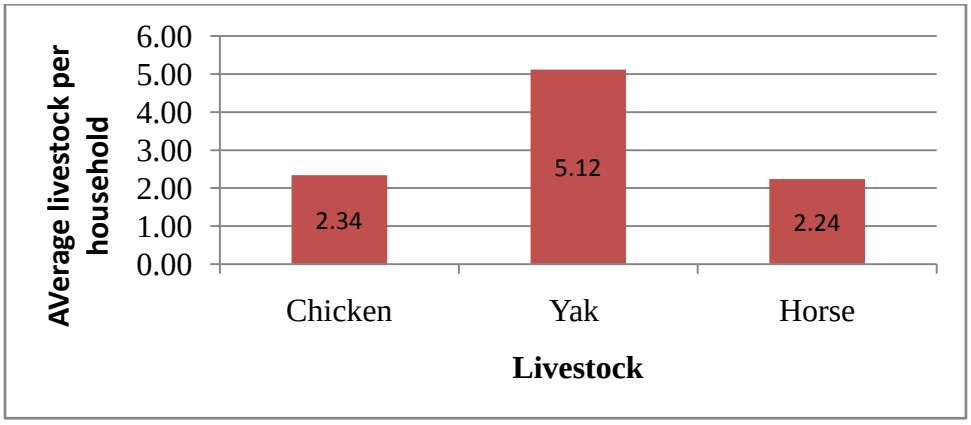
Source: *Field Survey 2012*

Due to the rocky and sloppy terrain, fertile soil was scarce and there was less production from the land. Also, snow and cold environment affect the growth of crops in the land. People having more land had opportunity to take part in tourism activities for camping, building lodges and resorts.

Chicken, Yak and horse were the 3 types of livestock reared by people in MCAP. Few houses were keeping chicken for meat. Almost all houses had owned Yak and horses. Each household had about 6 Yaks and 3 horses. Yak and horses was the indication of prosperity in the houses. Yak was used for transport of goods and for milk and meat while horse was used for transport of goods as well as human beings. The cost of each yak and horse was equal which was about NRs. 70,000. Average total livestock per HH in this study was 6.95 which were more than that observed by Rana (2008) (2.2/ HH).

People involved in tourism were keeping horse for transport of their goods while other non participants were keeping more yaks.

Figure 4.5: Livestock holding status of household

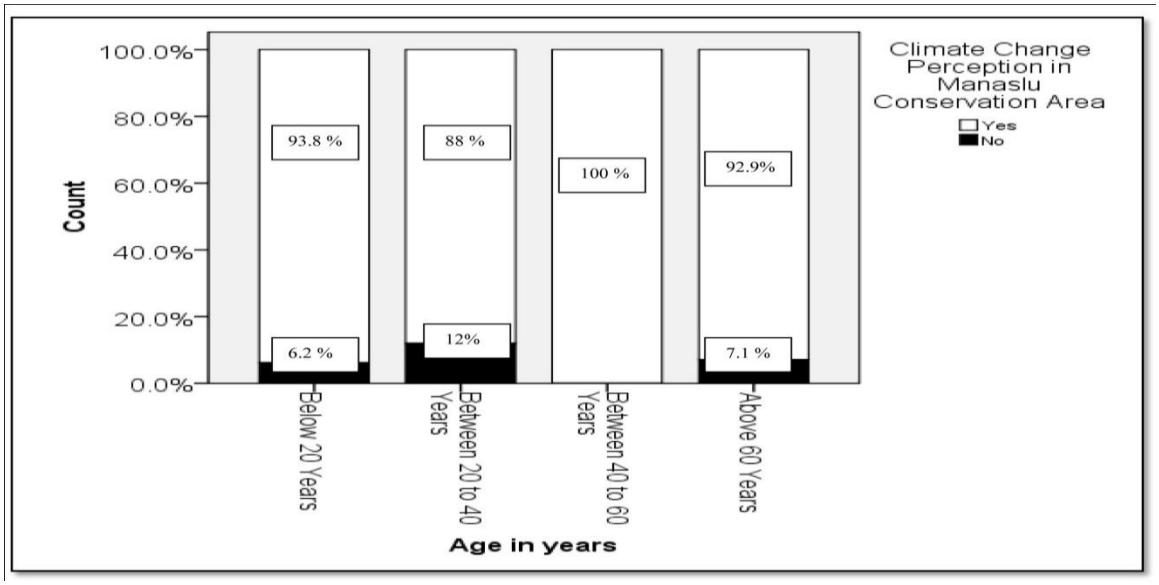


Source: *Field Survey 2012*

4.2 Climate Change Perception

During the questionnaire survey, Yes/ No question on climate change perception was asked to the respondents of 4 different age groups as shown in Figure-4.6. According to the response of local people from household survey, 100 percent respondents of age between 40 to 60 years experience climate change condition in MCA.

Figure 4.6: Climate Change Perception in MCA



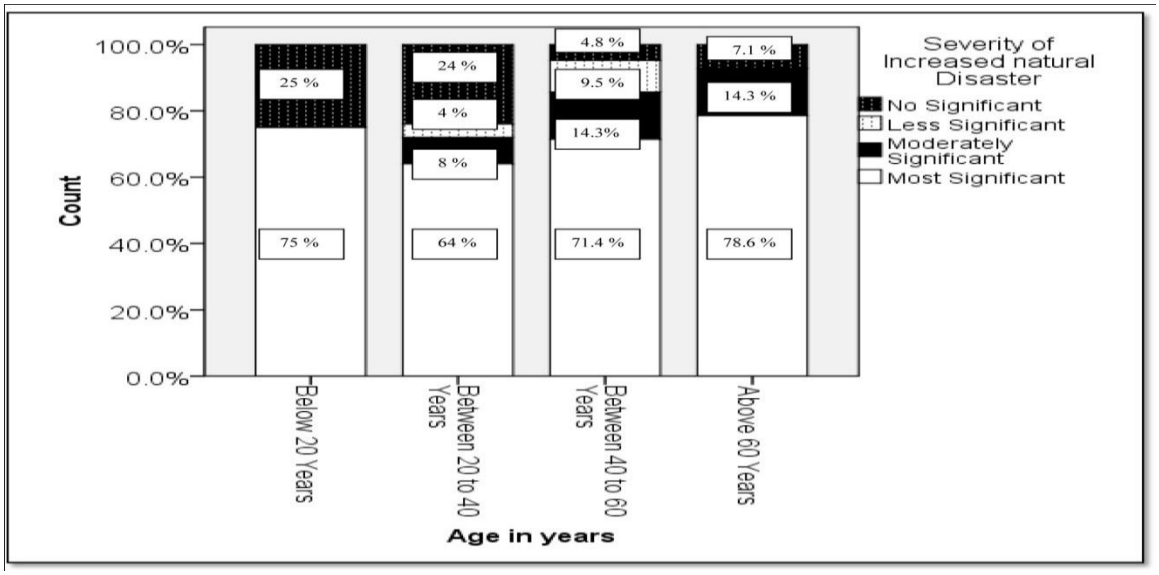
Source: *Field Survey 2012*

About 93.8, 88 and 92.9 percent respondents of age below 20 years, 20 to 40 years and above 60 years experience climate change, respectively in MCA. Very few people do not experience such climate change phenomenon in the area. It shows that climate change was seen in the area. All the key informants of Lho and Samagaon VDC experience climate change in MCA. They have been experiencing rise in temperature resulting into more snow melting in the Manaslu Mountain. Heavy snowfall in the month of April and May is also affecting their daily activities. Climate Change had been felt in the form of unfavorable weather change, increased natural disaster, instability of seasonal temperatures, impacts on agricultural production and economic instability.

4.2.1 Severity of Natural Disaster

The question on severity of natural disaster of four different significant levels was asked to four different age group respondents as shown in Figure-4.7.

Figure 4.7: Severity of increased natural disasters



Source: *Field Survey 2012*

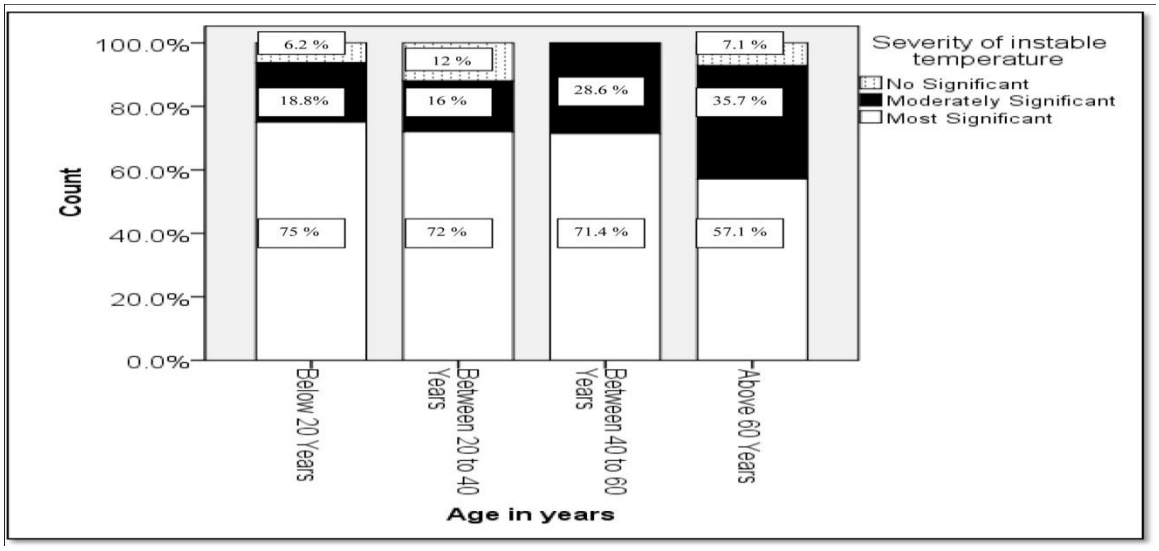
In the study area, occurrence of natural disaster was the most significant impact of climate change felt by key informants and other people. About 78.6 percent respondents of age above 60 years felt most significant impact on severity of natural disasters. About 7.1 percent respondent of age above 60 years did not find any significant impact of increased natural disaster in the area. 75, 64, 71.4 percent respondent of age below 20

years, 20 to 40 years and 40 to 60 years, respectively experience most significant impact on severity of natural disaster. Bhusal (2009) study in Lumle and Ghandruk VDC of Kaski district shows that 72 percent of the respondents felt increased incidents of drought. Chaudhary et al., (2011) study in the Kangchenjunga Himalayas region shows that more than 40 percent of local people claim that droughts are more frequent than before. Drought is perceived to have resulted in an increased incidence of forest fires in Lower Mustang area (Lama, 2010). Natural disaster frequently occurring in the study area is landslides due to the sloppy land in the Himalayas. The barren and the deforestated slope were much affected by the landslide. Very large landslides were seen occurring in the study area. Change in temperature and unfavorable weather change had increased intensity of natural disaster. There was threat in Samagaon VDC from GLOF event of Birendra Tal.

4.2.2 Severity of Instable Temperature

The question on severity of instable temperature of four different significant levels was asked to four different age group respondents as shown in Figure-4.8.

Figure 4.8: Severity of instable temperature



Source: *Field Survey 2012*

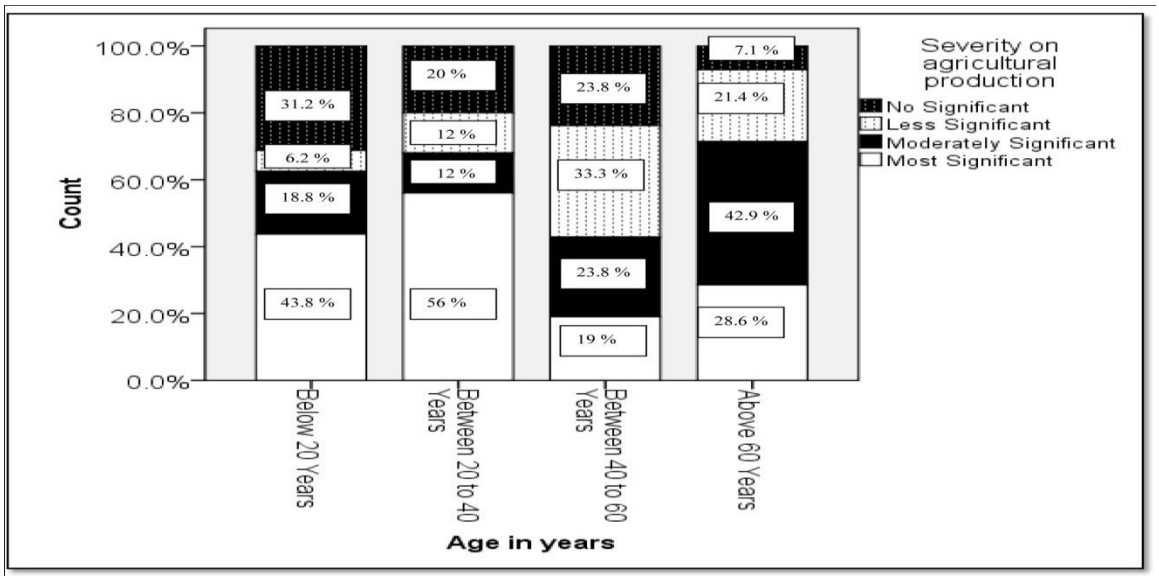
Key informants had felt significant impact of instable temperature resulting in climate change. During household survey, about 75 percent respondent of age below 20 years felt most significant impact of severity of instable temperature in the MCA. Severity of

instable temperature was seen moderately significant by 35.7 percent respondents of age above 60 years. Very less people saw no significant impact of climate change in temperature change. Dahal (2011) study on Sindhupalchowk district found that local communities experienced increasing warm days and shortening cold winter days. Over half of respondents (57%) were concerned about the possible impacts of climate change in Northern Ireland (DOE, 2009). Bhusal (2009) study in Lumle and Ghandruk VDC of Kaski district shows that 90 percent respondents perceive the temperature has increased. Chaudhary et al., (2011) study in the Kangchenjunga Himalayas region shows that 84.4 percent of the people believe that the weather is getting warmer and nearly 78.6 percent believe that onset of summer and monsoon has advanced during the last 10 years. Lama (2010) study on Lower Mustang shows that people perceive warm and dry winter. Due to increase in temperature, people felt melting of snow faster than before.

4.2.3 Severity on Agricultural Production

The question on severity on agricultural production of four different significant levels was asked to four different age group respondents as shown in Figure-4.9.

Figure 4.9: Severity on agricultural production



Source: *Field Survey 2012*

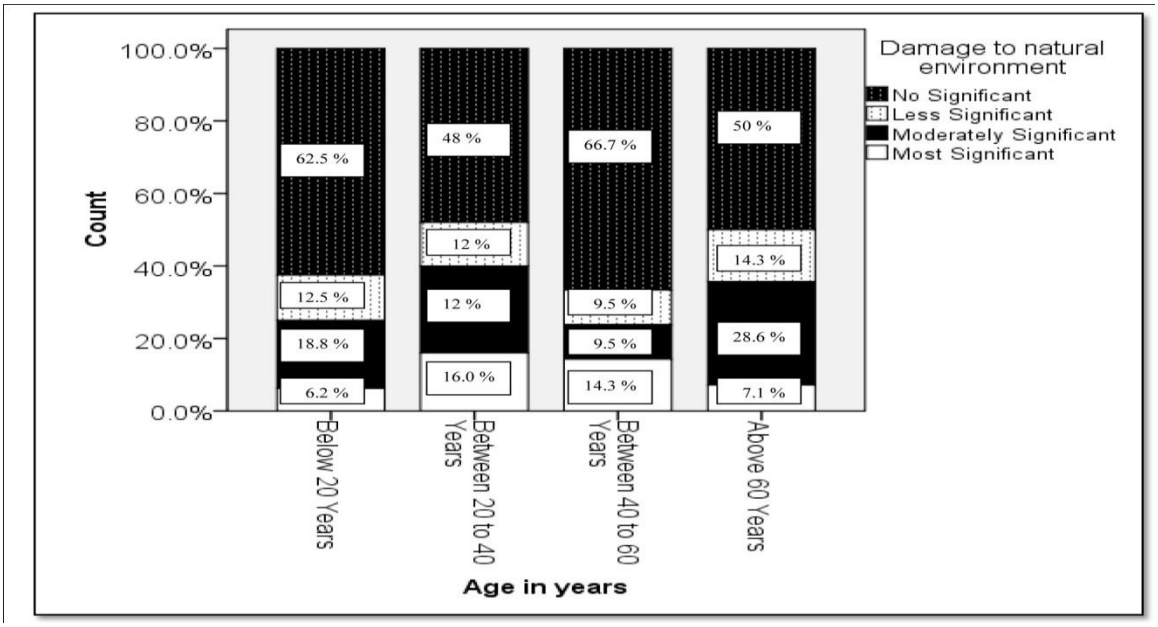
Heavy snowfall is affecting sowing of crops and overall growth of plant affecting agricultural productivity according to the view of key informants. From household

survey, about 56 percent respondents of age between 20 to 40 years observed most significant impact of climate change in agricultural production as they are directly involved in agriculture. And 42.9 percent respondents of age above 60 years observed moderately significant impact of climate change on agricultural production. No significant impact of climate change on agriculture was felt by 7.1 percent respondents of age above 60 years in MCA. According to Dahal (2011), climate change was affecting agriculture and production of main crops and cash crops has decreased. Different invasive species, pests and insects were increasing in farm. Many species of main crops such as rice, maize and millet species are in threat. A total of 56.8 percent of the people experienced early ripening or maturity of their crops and vegetables in Kangchenjunga Himalayas region (Chaudhary, et al., 2011).Production of wheat, karu, potato, millet and vegetables was affected by intense snowfall, draught and rainfall. The agricultural production was sufficient only for few months and they had to rely on food from Arughat and Tibetan market.

4.2.4 Damage to Natural Environment

The question on damage to natural environment of four different significant levels was asked to four different age group respondents as shown in Figure-4.10.

Figure 4.10: Damage to natural environment



Source: *Field Survey 2012*

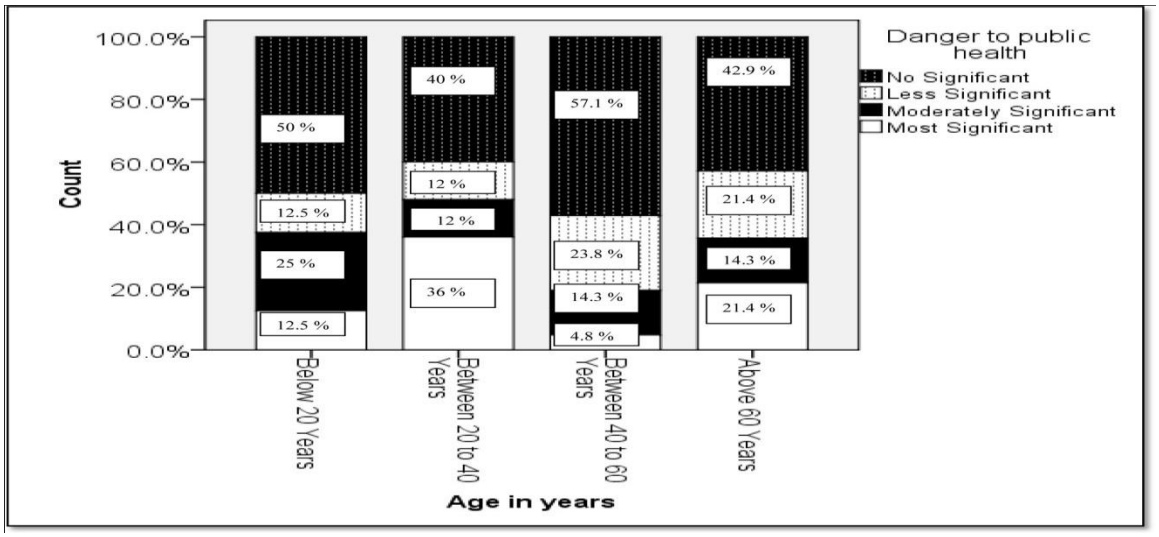
About 52.5, 48, 56.7 and 50 percent respondents of age below 20 years, 20 to 40 years, 40 to 60 years and above 60 years, respectively felt no significant impact of climate change on natural environment. Very less respondents felt less significant, moderately significant and most significant impact of climate change to the natural environment.

About 55 percent perceive significant impact on environment and wildlife in a study on Northern Ireland by (DOE, 2009). Climate change had not affected the situation of natural resource in the area. The natural resources and the environment were affected by the human disturbances.

4.2.5 Danger to Public Health

The question on danger to public health of four different significant levels was asked to four different age group respondents as shown in Figure-4.11. About 50, 40, 57.1 and 42.9 percent respondents of age below 20 years, 20 to 40 years, 40 to 60 years and above 60 years, respectively felt no significant impact of climate change on public health of people. But 36 percent respondent of age between 20 to 40 years felt the most significant impact of climate change on public health of local people.

Figure 4.11: Danger to public health



Source: *Field Survey 2012*

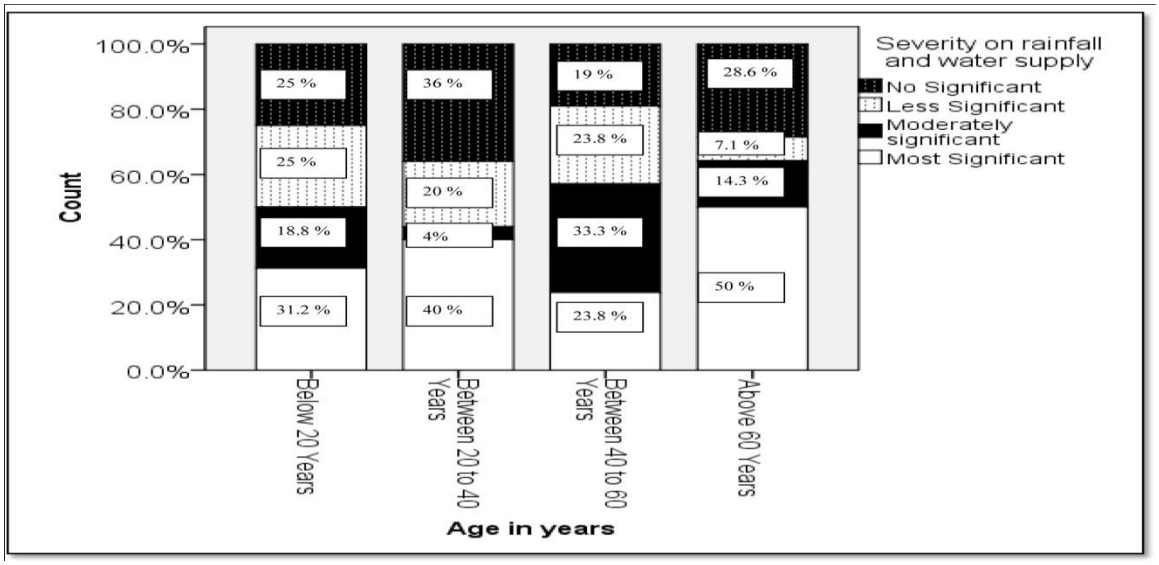
According to Dahal (2011), community members had experienced different new diseases resulting from including mosquitoes. 43 percent perceive significant impact on danger to public health in a study on Northern Ireland by (DOE, 2009). Different health problems

were increasing; especially women and children have been affected from itching problem, skin diseases, menstruation cycle, uterus infection (disease) and eye infection problem. 68.8 percent of the people have been observing mosquitoes in their villages for the last 4–5 years, mainly in lower hills in Kangchenjunga Himalayas region (Chaudhary, et al., 2011). As the study area lies above the altitude of 2500 masl, Climate change and global warming had very less impact on public health of the local people.

4.2.6 Severity of Rainfall and Water Supply

The question on severity of rainfall and water supply of four different significant levels was asked to four different age group respondents as shown in Figure 4.12.

Figure 4.12: Severity on rainfall and water supply



Source: *Field Survey 2012*

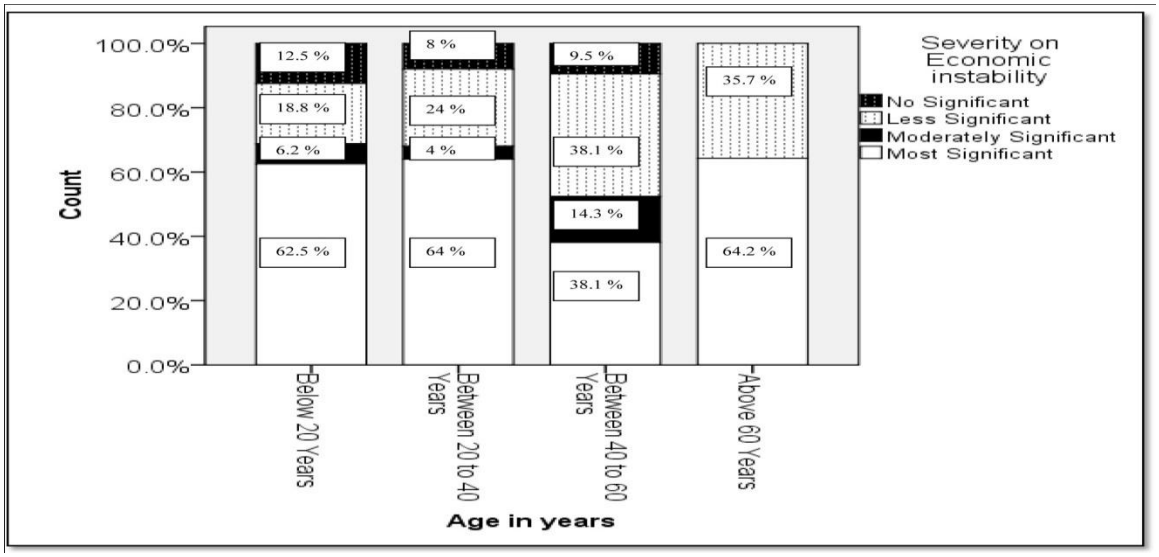
Unwanted snowfall and melting of snow in Manaslu Mountain is felt by all key informants. During household survey, 50, 23.8, 40 and 31.2 percent respondents from age above 60 years, 40 to 60 years, 20 to 40 years and below 20 years respectively felt the most significant impact of climate change on rainfall and water supply. And 28.6, 19, 36 and 25 percent respondents from above 60 years, 40 to 60 years, 20 to 40 years and below 20 years, respectively felt that there is no any impact of climate change on rainfall and water supply in the area. Dahal (2011) study on Sindhupalchwok district found that the pattern, intensity and amount of rainfall had changed resulting in the scarcity of water. Moreover people started feeling scarcity of water for irrigation and drinking.

Bhusal (2009) research in Lumle and Ghandruk VDC of Kaski district shows that 97 percent are experiencing unpredictable rainfall patterns since last 10 years. More than 50 percent respondents explored late start of monsoon, incidents of hail storm, warmer wind flow pattern and decreasing water sources. Chaudhary et al., (2011) study in the Kangchenjunga Himalayas region show that more than three-fourths of the local people believe that water sources are drying up and 60.2 percent of them feel that there is less snow in the mountains compared to the past. Lama (2010) study on Lower Mustang shows that decreased snowfall in winter meant mountains left with patchy thin cover of snow lose the natural and aesthetic beauty of the mountains. Rainfall and water supply have been affected by climate change in lower belt of the study area. In recent years, early monsoon and unfavorable rainfall in trekking season is occurring. In the higher belt of Lho and Samagaon VDC, snowfall in the month of April and May was occurring in recent years affecting tourism.

4.2.7 Severity of Economic Instability

The question on severity of economic instability of four different significant levels was asked to four different age group respondents as shown in Figure-4.13. Enhance in tourism and occurrence of natural disasters is the main drivers resulting in economic instability according to all key informants.

Figure 4.13: Severity on Economic Instability



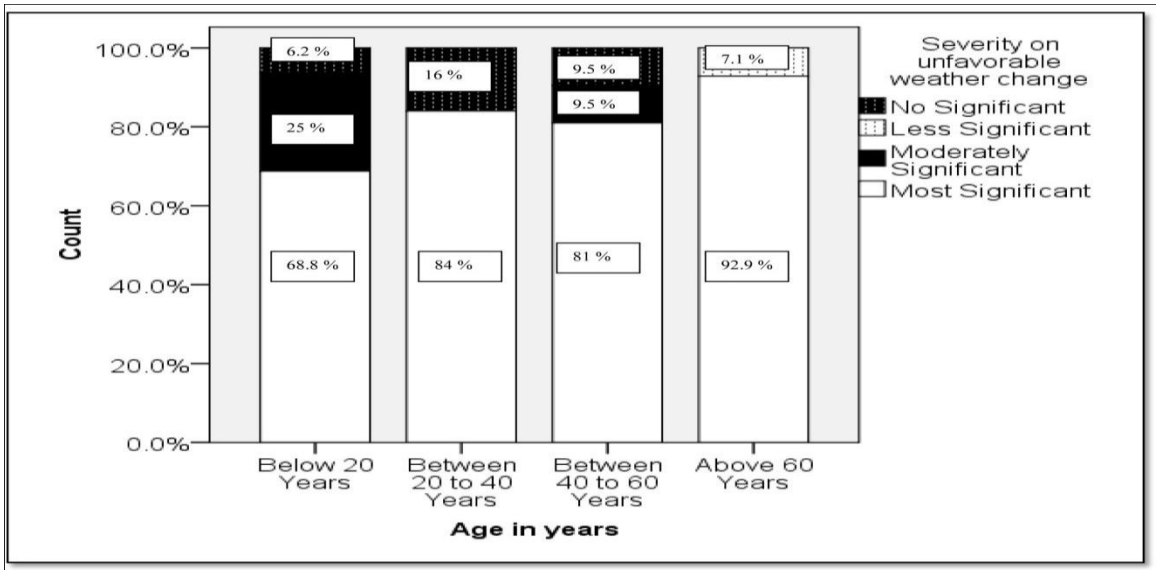
Source: *Field Survey 2012*

From household survey, about 62.6, 64, 38.1 and 54.3 percent respondents from age below 20 years, 20 to 40 years, 40 to 60 years and above 60 years, respectively felt that the climate change had most significant impact on economic instability of local people. And 12.5, 8, 9.5 percent respondents from age below 20 years, 20 to 40 years and 40 to 60 years, respectively felt that there is no significant impact of climate change on economic instability of local people. Economic instability is caused due to less agricultural production and occurrence of natural disaster negatively and more tourist inflow in the area positively. Increase in the number of trekkers in this area is helping to raise the economic standard of family involved in tourism business.

4.2.8 Severity of Unfavorable Weather Change

The question on severity of unfavorable weather change of four different significant levels was asked to four different age group respondents as shown in Figure-4.14.

Figure 4.14: Severity on unfavorable weather change



Source: *Field Survey 2012*

Most of the key respondents felt unfavorable weather change in MCA. About 92.9, 81, 84 and 68.8 percent respondents of age above 60 years, 40 to 60 years, 20 to 40 years and below 20 years felt that unfavorable weather change is occurring most significantly due to climate change. Only 25 and 9.5 percent respondents of age below 20 years and between 40 to 60 years respectively felt that weather change is moderately significant impact of climate change. 6.2, 16 and 9.5 percent respondents of age below 20 years, 20

to 40 years and 40 to 60 years, respectively felt that there is no significant impact of climate change on weather change. According to the public response, weather change was seen in the form of untimely and unfavorable rainfall and snowfall in the area.

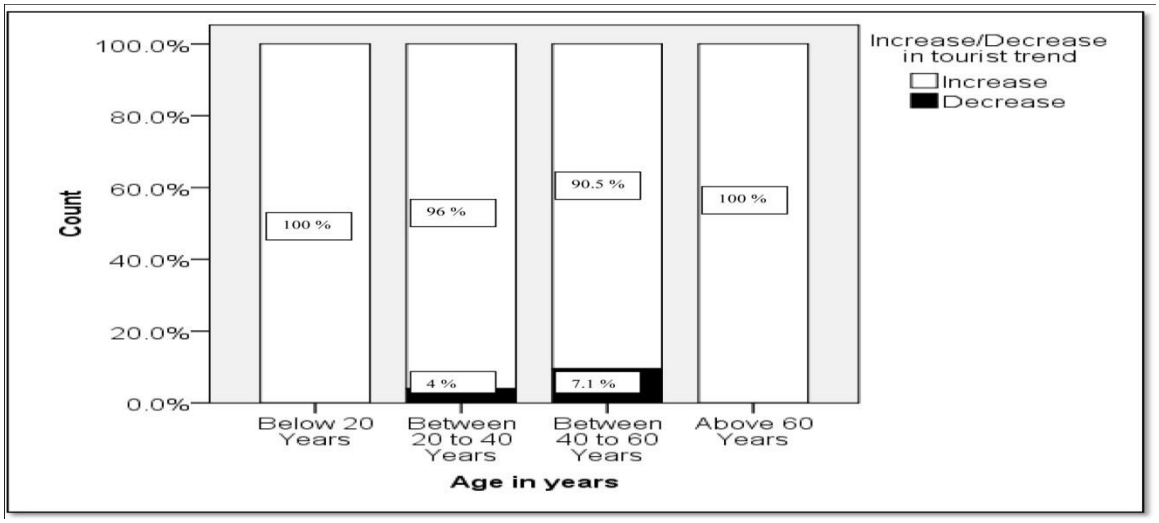
4.3 Climate Change and Tourism

Tourist data and people's perception data was analyzed combine in this part to study the relationship between climate change and livelihood.

4.3.1 Change in Tourist Trend

The question on severity of unfavorable weather change of four different significant levels was asked to four different age group respondents as shown in Figure-4.15.

Figure 4.15: Increase/ decrease in tourist trend

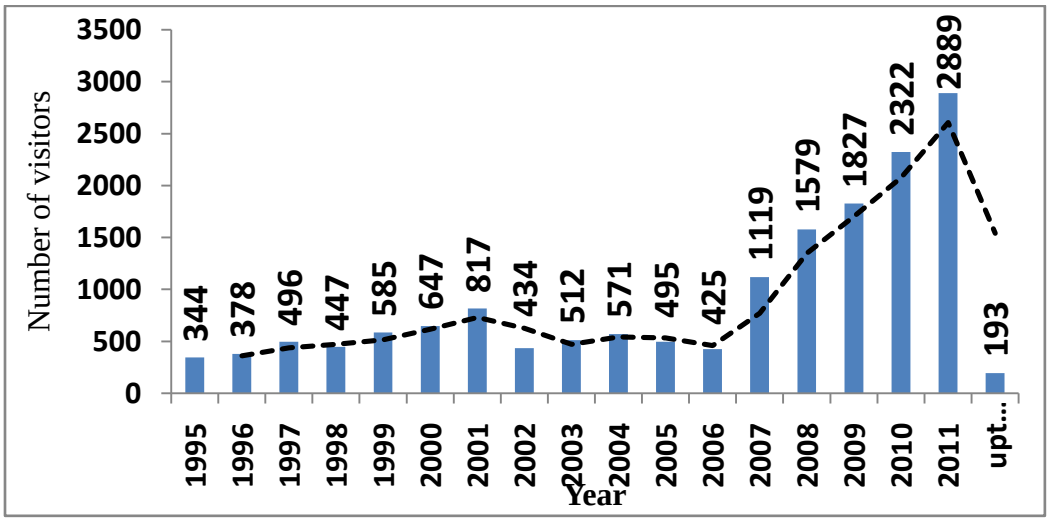


Source: *Field Survey 2012*

Number of tourist are increasing in the recent years compared to past according to the key respondents view. From the people perception, 100, 96, 90.5 and 100 percent respondents of age below 20 years, 20 to 40 years, 40 to 60 years and above 60 years, respectively felt that number of tourist is increasing in Manaslu Conservation Area. About 4 and 9.5 percent respondents of age between 20 to 40 years and 40 to 60 years, respectively felt that number of tourist is decreasing in Manaslu Conservation Area. The visitors' data from NTNC was taken and analyzed graphically to see the increasing or decreasing trend of tourist in MCA. From the Figure- we can see that the number of

visitors visiting MCA increases from 1995 till 2001. There were 344 and 817 visitors visiting in 1995 and 2001, respectively. And the number goes on decreasing till 2006 which was 425.The number of visitors again increased from 2007 onwards. According to the view of people, after the establishment of MCAP by NTNC in 1998, the visitors were increased as there were more facilities available for the tourist.

Figure 4.16: Number of Visitors visiting MCA



Source: *NTNC, 2012*

Due to the political instability after 2002, the number of tourist decreases. Dhakal (2005) observed that trekking tourism has declined in recent years from a normal level of over 25 percent to 18 percent of overall tourists in 2004. Sixty nine percent of the lodge-owners and guides of Annapurna trekking trial said that there have been changes in the tourism season (Rayamajhi, 2012). Subedi & Chapagain (2011) study on Upper Manang found that from 2002 to 2006, the number of tourists visiting the Manang valley decreased and started increasing from 2007. During these years, the total trekkers in the three major routes, namely Annapurna, Everest and Langtang decreased drastically. Later on, when the Maoist problem was solved in 2007, the number of visitors was also increased. MCAP as well as local clubs started organizing cultural festivals for the publicity of MCA to attract tourists and increase the length of the stay. Currently, there are sufficient hotels, restaurants and other facilities necessary for the tourist so tourist are attracted and getting opportunity to buy things according to their wish. Due to the

promotion of tourism business and marketing of the area for tourist, there was increasing trend of tourist in the study area. It was seen that the tourist flow was higher in October and November season that in the April and May season.

4.3.2 Climate Change and Tourism

Climate Change had positive significant impact in tourism in MCA. Tourist visit MCA to climb Manaslu Mountain and go through Larke Pass. Less snowfall and high temperature during the tourism season make it easier for the tourists to climb mountain and to cross Larke Pass. It encourages tourists to do trekking in Manaslu area. Despite the change in climate in Annapurna Conservation Area, and the shift in tourism seasons that varies every year, 62.9 percent said that the number of tourists has been increasing (Rayamajhi, 2012). Lama (2010) study on Lower Mustang shows that that warmer winter is removing a barrier for trekking tourism. Water scarcity is affecting the stakeholders operating hotels in villages such as Muktinath, Kagbeni, Puthang, Marpha and Lete. According to the view of respondents during household survey, local leaders and educated people of the area during Key Informant Interview, they were experiencing the climate change. There was increasing trend of tourist in the recent years from NTNC data as well as from people's perception. Respondents had felt that the increase in tourist trend may be due to the impact of climate change and other publicity related activities. Also, increase in number of tourists was due to the enhancement of tourism business, facilities, advertisement and marketing of the area for tourism**.**

4.4 Tourism and Livelihood

To collect information related to tourism and livelihood, questions about socioeconomic components affecting tourism and livelihood were asked and regression analysis was carried out as explained in chapter 3.6. The second column of table- 4.1 shows that regression model is fit and significant ($p< 0.01$) with F test value 4.26 but with weak and poor performance of variables as R square value is 0.36. Productive human capital, size of household, square of size of household, livestock and education are insignificant ($p<0.1$) with per capita household consumption. It means that household consumption does not increase by increase in productive human capital, size of household, livestock and education by this study.

Table 4.1: Relationship of Tourism, Livelihood and Climate Change

Dependent Variable: Per Capita Household Consumption		
Independent variables	Without Climate Change	With Climate Change
Climate Change	-	811.42 (16542.59)
Productive Human Capital	-614.10 (3346.25)	-595.63 (3392.79)
Size of Household	-11797.55 (28173.68)	-11834.287 (28398.92)
Square of Size of Household	804.62 (4644.89)	805.54 (4680.43)
Education	-861.16 (2680.88)	-841.357 (2731.36)
Physical Capital	-15198.14* (8388.79)	-15208.30* (8455.46)
Square of Physical Capital	1508.83* (900.25)	1510.85* (908.06)
Livestock	0.01 (0.01)	0.006 (0.008)
Tourism Participation	26944.40*** (9009.35)	26858.06*** (9247.30)
Income	0.08*** (0.02)	0.076*** (0.023)
Constant	92124.43** (41533.64)	91328.52* (44886.71)
Observations	76	76
R-squared	0.36	0.37
F-test	4.26***	3.77***

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Source: *Field Survey 2012*

Physical capital and square of physical capital are significant (p<0.1) with household consumption. As physical capital which (land) is more, household consumption is more. Household having more land had more opportunity to use their land in tourism activities such as camping, recreational activities and adventurous activities. Also, they can grow more crops than others. Farooq et al., (2012) study on Galliyat, District Abbotabad found that household consumption depend on physical capital.

Tourism participation is positive and significant ($p<0.01$) with household consumption. It shows that the per capita household consumption is more in household with tourism participation. By participating in tourism activities, people are able to generate more income and are increasing their household consumption. Guha & Ghosh (2007) study in Indian Sundarbans found that households entering into tourism-related occupations have significantly raised their living standard compared to other non-participating households. Farooq et al., (2012) study on Galliyat, District Abbotabad found that per capita household consumption is more in household who participate in tourism related activities.

Similarly, income has positive significant impact ($p<0.01$) on per capita household consumption. As income of the household increases, per capita household consumption also increases. The study done by Adhikari & Fisher (2008) in Ghandruk VDC of Kaski district found that there is a trade-off between economic benefit, environmental and socio-cultural costs. Hence, ownership of more land influences people to involve in tourism business which helps to generate more income to have direct effect on their consumption pattern. So tourism had direct effect on livelihood of people in MCA.

4.5 Tourism, Livelihood and Climate Change

To gather information related to climate change, tourism and livelihood, questions about climate change perception and socioeconomic components affecting tourism and livelihood was asked and regression analysis was carried out. The third column of table-4.1 shows that regression model is fit and significant ($p< 0.01$) with F test value 3.77 but with weak and poor performance of variables as R square value is 0.37.

Relationship of other variables except climate change is already discussed in chapter 4.4. Climate change variable is not significantly ($p>0.1$) related to per capita household consumption. From the regression analysis, it was found that per capita household consumption as an indicator of livelihood was not affected by climate change in my study area. It means that climate change had no impact on livelihood of people in the current time. If climate change persists in the future, it might cause adverse impact on livelihood of the people.

CHAPTER V
SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of Findings

Climate Change had impact on tourism and livelihood through increased stresses placed on environmental systems. So, this research was carried out to assess the relationship of tourism, climate change and livelihood in Manaslu Conservtion Area (MCA) of Gorkha district of Nepal. The study was done with the help of 76 household (HH) survey, 3 focus group discussions (FGD), 5 key informant interviews (KII) and by analysis of secondary data and literature. Regression model was used to assess impact of tourism in livelihood and impact of climate change and tourism in livelihood. A brief summary of finding of the study is as follows.

Both male and female are participating in tourism related activities as seen in field observation and household survey. There is more involvement of married adult people in the tourism business and their family member ranges from 2 to 8 members. The families having more members are easily conducting tourism business without employing supporting staff. Literate people are seen more involved in tourism business than the illiterate people. Majority of respondents are involved in tourism. People having more land have opportunity to take part in tourism activities for camping, building lodges and resorts. People involved in tourism are keeping horse for transport of their goods while other non participants are keeping more yaks.

Climate Change have been felt in the form of unfavorable weather change, increased natural disaster, instability of seasonal temperatures, impacts on agricultural production and economic instability. Natural disaster frequently occurring in the study area is landslides due to the sloppy land in the Himalayas. Due to increase in temperature, people feel melting of snow faster than before. Production of wheat, karu, potato, millet and vegetables is affected by intense snowfall, draught and rainfall. In the higher belt of Lho and Samagaon VDC, snowfall in the month of April and May is occurring in recent years affecting tourism. Economic instability is caused due to less agricultural production and occurrence of natural disaster negatively and more tourist inflow in the area

positively. Weather change is seen in the form of untimely and unfavorable rainfall and snowfall in the area.

There is increasing trend of tourist in the recent years from NTNC data as well as from people's perception. Respondents had felt that the increase in tourist trend may be due to the impact of climate change and other publicity related activities.

By participating in tourism activities, people are able to generate more income and are increasing their household consumption. As income of the household increases, per capita household consumption also increases. Hence, ownership of more land influences people to involve in tourism business which helps to generate more income to have direct effect on their consumption pattern. So tourism has direct effect on livelihood of people in MCA.

Climate change had insignificant impact on livelihood at present.

5.2 Conclusion

From the finding of this study, the conclusion is drawn as follows:

- Socioeconomic variables such as marital status, size of household, education and land holding status had positive effect on tourism participation while livestock holding status and occupation of the HH had negative effect on tourism participation. Both, male and female are involved in tourism. These variables are influencing household to be involved in tourism.
- Climate change impact was perceived as increase in frequency of landslides, increase in temperature resulting in faster melting of snow, unfavorable weather change phenomenon, snowfall in the month of May, decrease in agricultural productivity and economic instability affecting the livelihood of people.
- Climate change had positive significant impact on tourism as number of visitors is increasing in MCA in recent years.
- Tourism participation is helping local people to earn more money and improve their living standard.
- Climate change had insignificant impact on livelihood of the people at present.

5.3 Recommendations

Based on the above findings and conclusions, following recommendations can be put forward:

- As education had direct positive effect influencing people towards tourism, awareness and education programmes related to tourism would be beneficial for local people. It would encourage and attract interest of local people towards eco tourism.
- Men and women are equally involved in tourism and vulnerable to climate change. So, gender empowerment of women would help in tourism promotion and adaptation towards climate change in MCA as they can contribute more time on it.
- MCAP is not much familiar to the national and international tourist. So, for advertisement and publicity on tourism promotion in national and international level, Nepal Tourism Board and MCAP should organize local festivals regularly. It should focus in providing new opportunities for tourism from climate change.
- Government and nongovernmental organizations should provide adequate subsidy and training on ecotourism to encourage local people in self employment. Skill development trainings on handicraft would involve more people in tourism and generate income. It would have positive impact on livelihood of the people.
- Due to the lack of adequate climate data, time and resource, detailed study on tourism, climate change and livelihood in MCA was not possible. So, further research to identify the relationship between climate change, tourism and livelihood is recommended.

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Annex 1: *Questionnaire for HH Survey*

Impact of Climate Change on Tourism and Livelihood in MCA

A Household Survey Questionnaire

==========

Name of the respondent: Age: Interview date:

Address:District: VDC/NP: Ward number: Village:

==========

I. Basic household information:

Q. 1: Please tell about your household members and their relationship? (Only write relationship to the respondent and gender in the table Male-1, Female-2)

Q. 2: How old is each household member?

Q. 3: What is the marital status of each household member?

1 – Married 2 – Unmarried 3 – Widowed 4 - Separated 5 - Divorcee

Q. 4: What is the highest educational attainment of each of your household member?

1-Illiterate; 2-Literate; Other level (MENTION THE EXACT LEVEL, IN THE TABLE)

Q. 5: Which household member is engaged in what occupation or activity?

1 – Farming; 2 –Tourism Business; 3 – Service; 4 – Wage labour; 5 –Work abroad; 6 – Other (specify)

USE CODES GIVEN ABOVE AS APPROPRIATE AND RECORD FACTS & FIGURES IN TABLE

S.N./ Code	Q. 1 HH Member	Gender	Q.2 Age	Q. 3 Marital status	Q. 4 Education	Q. 5 Main occupation
1						
2						
3						
4						
5						

II. Q.6: What is your average household monthly expenditure in different categories?

Categories	Sub Categories	Quantity(unit)	Price per unit(in NRs)	Total expenditure
Food	**Paddy**			
	Grocery item			
	Fish/Meat/Vegetables			
Health(Check up&medicine)				
Education				
Fuel	**LPG**			
	Kerosene			
	Fuel wood			

III. Q.7: Crop cultivation in previous one year

(Income aspect) **(Expenditure aspect in NRs)**

S. N	Name of crop	Amount of crop harvested	Did you sell?(value in NRs)	Labour Cost	Seed cost	Fertilizer

IV. Q. 8: Livestock holding status of the family with its associated costs and benefits.

Species	Cow	Buffalo	Ox	Goat	Chicken	Pig	Yak	Other?
Current Number								
Earning in previous year by selling them								
Cost involved in livestock rearing (Labour Cost)								
(Food Cost)								

V. Economic Benefit and Cost from Tourism

Q. 9: Total number of tourist stayed in your house last year? National International

Q.10: What type of work did you and /or the members of your family perform as tourist

ervice in previous year?

Code of family member	Service to tourist	How many days in a year	Income(in NRs)	Cost involved(in NRs)

VI. Climate Change Perception (Initially introduction is given about climate change and its impacts to the respondent globally)

Q.11. Do you think climate change is occurring in MCA and it had direct impact on you and your family? Yes No

Q. 12. Tell about the potential impacts of Climate Change on following topics on the basis of severity.**Most Significant-1; Moderately Significant-2; Less Significant-3; No significant impact-0**

1. Increased natural disasters

2. Instability of seasonal temperatures

3. Impacts on agricultural production

4. Damage to natural environment and wildlife

5. Danger to public health

6. Rainfall and water supply

7. Economic instability

8. Unfavorable weather change

VII. Climate Change and its impact on Tourism and Livelihood

Q.13. Do you think number of tourists increase/decrease in recent years? Yes No

Q.14. Do you think this change in number of tourist is associated with climate change? Yes No (If Yes, How?)

Q.15. Had your yearly expenditure changed in past years? Yes No

Checklist for Focus Group discussion and Key Informant Interview

Name list of participants in FGD

S.N.	Name	Occupation/Recognition	Address	Signature
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

Facilitator/ Moderator of FGD- Anup KC

Introduction of moderator

Climate Change introduction and its associated impacts in MCA.

Key Issues to be focused

1. Major economic activities of the villagers
2. Population composition of the village by age(Below 11, Between 11-50, Above 50)
3. Tourist flow in different season
4. Yearly average number of tourist, National International
5. Facilities provided to tourist in the village
6. Sources of food, grocery items, vegetables and non veg. item to provide facility to tourist.
7. Involvement of local clubs/groups in providing information and for distribution of tourist in different houses.
8. Total number of home stay/hotels in the village.
9. Economic status of the villagers.
10. Tourism(Number) and livelihood of the villagers (expenditure pattern of villagers)
11. Climate Change introduction and its impacts
12. Perceptions of people towards climate change and its impacts(From the questionnaire)

Impacts of climate change on tourism and livelihood (expenditure pattern of villagers)

Annex 3: Some photo snaps

Researchers entering MCA

Researcher filling Questionnaire survey

Researchers doing group meeting

Researcher involved in meeting in Sama

Researcher conducting FGD with local youth

Researcher involved in KII in Lho