Copyright Statement

The digital copy of this thesis is protected by the Copyright Act 1994 (New Zealand).

This thesis may be consulted by you, provided you comply with the provisions of the Act and the following conditions of use:

- you will use the copy only for the purposes of research or private study
- you will recognise the author's right to be identified as the author of the thesis and due acknowledgement will be made to the author where appropriate
- you will obtain the author's permission before publishing any material from the thesis.
Vulnerability of Nature Based Tourism to Climate Change: Stakeholders’ Perceptions of and Response to Climate Change in the lower Mustang Region of the Annapurna Conservation Area

A thesis submitted in partial fulfilment of the requirements for the Degree of Master of Parks, Recreation and Tourism Management at Lincoln University by Anu K. Lama

Lincoln University 2010
Abstract of a thesis submitted in partial fulfilment of the requirements for the Degree of Master of Parks, Recreation and Tourism Management

Vulnerability of Nature Based Tourism to Climate Change: Stakeholders’ Perceptions of and Response to Climate Change in the lower Mustang Region of the Annapurna Conservation Area

By
Anu K. Lama

Nature based tourism (NBT) is a major contributor to the economy of the lower Mustang region in Nepal. This high Himalayan region is an important destination within the Annapurna Conservation Area (ACA). The contribution of NBT to conservation is also significant. However, recently, NBT is being subjected to multiple stressors. Socio-economically, the opening of the Beni – Jomsom road has transformed this remote area with its subsistence economy to a busy destination with diverse tourism activities and a cash based economy. The ruling regime change and the ongoing political instability have also affected the NBT supply system of lower Mustang. Similarly increasing climate variability and other climatic changes are increasing the vulnerability of the place, the people and their livelihoods.

This research reports on an investigation into the vulnerability of the NBT supply system of lower Mustang to these multiple stressors, with special emphasis on climate change. In particular, the study explores the key drivers of change, and analyses the sensitivity and adaptive capacity of the system through the tourism stakeholders' perspectives. A vulnerability assessment framework has been developed to understand stakeholders’ perceptions of the exposure to and impacts of these multiple stressors. A multi-methods qualitative approach was used to elicit understandings of climate change among public and private tourism stakeholders.
This study found that the NBT supply system is exposed to climate variability and change. However, it was also evident that climate change is occurring amidst a number of other socio-economic and political changes. The new road, changing tourism dynamics, low carrying capacity, and demographic forces, coupled with the ongoing political instability and destabilized power structures in the communities are important vulnerability issues for the system and its management.

The study shows that stakeholders have a wide range of perceptions and levels of awareness and knowledge on climate change which is based on their historical relationships with the environment, experiential knowledge tied closely to livelihood practice, and holistic understanding, rather than scientific knowledge. Impacts of climate variability are perceived to affect all three key assets (tourism, human and natural) of the NBT system. The range of climatic impacts, the system’s sensitivities to them, and the adaptive capacities are varied and socially constructed. Most importantly, the study shows that the contexts for stakeholders’ vulnerability to climate change are multidimensional and that they are shaped by non-climatic stressors, such as socio-economic change and political change. In turn, these perceptions are likely to influence the NBT supply system itself and its vulnerability to climate change.

Keywords: adaptive capacity, climate change impacts, climate variability, exposure, lower Mustang, Nature Based Tourism, Nepal, perception, sensitivity, stakeholders, vulnerability
Acknowledgements

The human psychology that inspires an individual to commit to work for the cause s/he believes in is very complex. At every step of our life we are affected by life’s different unfolding paths and the people with whom we interact. There are many important individuals and institutions whose acquaintance, support and encouragement have allowed me to complete this thesis. I owe my deepest gratitude to my ‘Ama’ (mother), who always had an intense desire to provide me with higher education, and who has played a pivotal role in my life that helped me fulfill ‘our dream’.

I am also indebted to the Mingma Norbu Sherpa Memorial Scholarship Programme, Sir Edmund Hillary’s Himalayan Trust, scholarship committee members and Lincoln University (LU) for providing me this opportunity. Without the financial support and their goodwill, it would have been impossible to obtain my Masters degree at LU. I am extremely grateful to Dr David G. Simmons, Professor, Faculty of Environment, Society and Design (FESaD), LU, and Dr Stephanie Rixecker, Dean, FESaD, LU, for providing additional financial support for my field trip to Nepal.

It is an honour, as well as my good fortune, to have two of the most acclaimed academicians of the FESaD, Dr Stephen Espiner and Associate Professor Susanne Becken as my supervisors. They have mentored me, tolerated my blabbering, and provided valuable time and encouragement from the beginning of my intellectual journey in writing this thesis. Most importantly, the insights and expertise of Dr Stephen in the field of Natural Resource Recreation, Risk Perception/ Assessment and Research Techniques and Dr Susanne in Climate Change, Tourism and Research Techniques, have given me invaluable knowledge to produce this thesis.

This thesis would not have been possible without the valuable support of the people of lower Mustang. Despite the time being the busy harvesting season, many ‘amaharu’ (mothers), ‘buwaharu’ (fathers), ‘daju-bhai haru’ (brothers) and ‘didi-bahini haru’ (sisters) of the Lete, Kobang, Tukuche, Marpha, Jomsom, Kagbeni and Muktinath Village Development Committees (VDCs), graciously accepted my requests and provided their valuable time, knowledge and experience, wholeheartedly. I have also not forgotten the words of many of them who told me, “We expect that our information on the experience of having to deal with the problems faced by tourism in our village will be propagated and not just limit it to the
thesis document.” I hope that the research findings will help provide a way forward to the people and the institutions responsible for managing tourism in lower Mustang.

With respect to institutions, I am sincerely thankful to the staff of National Trust of Nature Conservation (NTNC) and Annapurna Conservation Area Project (ACAP), especially Executive Officers of NTNC, Mr Ganga Jung Thapa and Dr Siddhartha Bajra Bajracharya and Director of ACAP, Mr Lal Prasad Gurung, for allowing me to conduct research in lower Mustang. Special thanks also go to Ngamindra Dahal, Paras B. Singh and Krishna Gurung for providing me support and sharing their experiences. My sincere thanks are also due to important individuals: Arun B. Shrestha (ICIMOD), Buddhi Ratna Sherchan, Chandra Lama (Kag Choede Monastery), Gehendra Gurung (Practical Action), Kalpana Sherchan (Tukuche Distillery), Lal Prasad Lamichhaney (VDC, Lete), Madan Kumar Shrestha (Marpha Horticulture Centre), Mani Adhikari (DDC, Mustang), Moon Shrestha (WWF, Nepal), Purneshwwor Subedi (Department of Forest), Sesh Mani Bhattarai (District Forest Office, Jomsom) and Shreemaya Thakali (former Member of Parliament, Mustang), who shared valuable information during my stays in Mustang, Pokhara and Kathmandu. I am also extremely grateful to Dr Gavin Kenny (Earthwise Consulting Limited, New Zealand) and Mr Shailendra Thakali for their keen interests in my work and the valuable insights offered during this period.

It gives me greatest pleasure to thank my post grad fellow ‘union members’ Eurico Viana Neto (Brazil), Philippa Rawlinson (New Zealand), Sam Son (South Korea) and Sisa Kini (Papua New Guinea). Our strong alliance, from the beginning of our university days provided me the best support to face the gruelling post grad life at LU. As diverse as you are, each of you brought unique intellect, humour and passion that have both enriched my knowledge and inspired me to keep working towards the goal of completing the thesis. Equally important are friends and colleagues such as Erin Smith, Jill Greenhalgh, Kate Hicks, Kyran Tranter-Watson, Raviv Carasuk and Roland Foster. I am profoundly grateful to all of you for being there and lending your ears and thoughts when I needed them most. Thank you, guys!

Similarly, I am especially thankful to the staff of LU, Douglas Broughton, Jane Edwards, Michelle Collings and Pat Quarles for their incessant support throughout my academic journey. A big thank you to Dr Eric Scott for his professional editorial help. Last, but not the least, my sincere thanks to Dr Pat Devlin and Mr Chandra Rai for their support that helped for a smooth transition to my life in New Zealand.
Table of Contents

Abstract ............................................................................................................................................ ii
Acknowledgements ........................................................................................................................ iv
Table of Contents ........................................................................................................................... vi
List of Tables .................................................................................................................................. ix
List of Figures.................................................................................................................................. x
List of Plates ................................................................................................................................... xi

Chapter 1 Introduction: An Overview of the Study ................................................................. 1
  1.1 Introduction..................................................................................................................... 1
  1.2 Rationale for Vulnerability Assessment of NBT in lower Mustang ................... 3
    1.2.1 Thesis Aim and Objectives .................................................................................... 6
    1.2.2 Importance of the Thesis and Its Contribution ..................................................... 6
  1.3 Definition of Terms ........................................................................................................ 7
  1.4 Structure of the Thesis .................................................................................................... 9

PART A: Background ................................................................................................................... 11

Chapter 2 Researching Vulnerability Assessment of NBT supply system to Climate Change: Stakeholders’ Perception ................................................................. 11
  2.1 Introduction................................................................................................................... 11
  2.2 Overview of the Nature Based Tourism and Supply System .................................... 11
  2.3 Climate Change in the Context of Nepal .................................................................... 14
  2.4 Nature Based Tourism in the Face of Climate Change .............................................. 18
  2.5 Vulnerability Assessment Conceptual Approach ....................................................... 20
    2.5.1 Defining Vulnerability ......................................................................................... 20
    2.5.2 Conceptual Approach ........................................................................................... 20
  2.6 Public Understanding of Climate Change ................................................................... 23
    2.6.1 Place and Location ............................................................................................... 24
    2.6.2 Agency and Power ............................................................................................... 25
    2.6.3 Communication .................................................................................................... 26
    2.6.4 Values and Belief ................................................................................................. 26
  2.7 Chapter Summary ......................................................................................................... 28

Chapter 3 Lower Mustang: The Northern Frontiers of Annapurna Conservation Area ....... 30
  3.1 Introduction ................................................................................................................... 30
  3.2 Geographical Location ................................................................................................. 30
  3.3 Geomorphology of the Area ........................................................................................ 31
  3.4 Socioeconomic Conditions of lower Mustang ............................................................ 32
    3.4.1 Demography and Ethnicity .................................................................................. 33
    3.4.2 Livelihood Options and Strategies ...................................................................... 35
    3.4.3 Social Networks ................................................................................................... 36
  3.5 Nature Based Tourism Supply in Lower Mustang ..................................................... 36
    3.5.1 Natural Assets ....................................................................................................... 37
      3.5.1.1 Physical Resources............................................................................................ 37
      3.5.1.2 Biological Resources .................................................................................... 38
    3.5.2 Human Assets ....................................................................................................... 39
      3.5.2.1 Socio-Cultural Resources .............................................................................. 39
      3.5.2.2 Socio-Economic Resources .......................................................................... 40
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5.3 Tourism Assets</td>
<td>40</td>
</tr>
<tr>
<td>3.5.3.1 Accommodations</td>
<td>40</td>
</tr>
<tr>
<td>3.5.3.2 Road Access</td>
<td>41</td>
</tr>
<tr>
<td>3.5.3.3 Activities</td>
<td>42</td>
</tr>
<tr>
<td>3.5.4 Nature Based Tourism Governance in lower Mustang</td>
<td>44</td>
</tr>
<tr>
<td>3.5.5 Tourism Stakeholders</td>
<td>45</td>
</tr>
<tr>
<td>3.5.6 Chapter Summary</td>
<td>45</td>
</tr>
<tr>
<td>PART B: Methodology</td>
<td>47</td>
</tr>
<tr>
<td>4.1 Introduction</td>
<td>47</td>
</tr>
<tr>
<td>4.2 Climate Change Vulnerability Assessment Framework</td>
<td>47</td>
</tr>
<tr>
<td>4.3 Qualitative Research Approach</td>
<td>49</td>
</tr>
<tr>
<td>4.3.1 Exploring the contexts</td>
<td>50</td>
</tr>
<tr>
<td>4.3.2 Investigating Stakeholder’s Understanding of Climate Change</td>
<td>51</td>
</tr>
<tr>
<td>4.3.2.1 Direct Observation</td>
<td>51</td>
</tr>
<tr>
<td>4.3.2.2 In-depth Interview</td>
<td>52</td>
</tr>
<tr>
<td>4.3.2.3 Participant selection</td>
<td>53</td>
</tr>
<tr>
<td>4.3.2.4 Conversation with Institutional Representatives</td>
<td>54</td>
</tr>
<tr>
<td>4.3.3 Ethical Considerations and Strategies</td>
<td>55</td>
</tr>
<tr>
<td>4.3.4 Data Analysis</td>
<td>55</td>
</tr>
<tr>
<td>4.4 Limitations of the Study</td>
<td>56</td>
</tr>
<tr>
<td>4.4.1 Sampling Bias</td>
<td>56</td>
</tr>
<tr>
<td>4.4.2 Value Laden Interpretation</td>
<td>56</td>
</tr>
<tr>
<td>4.4.3 Credibility of the Data</td>
<td>57</td>
</tr>
<tr>
<td>4.4.4 Ethical Issue</td>
<td>57</td>
</tr>
<tr>
<td>4.5 Chapter Summary</td>
<td>57</td>
</tr>
<tr>
<td>PART C: Results and Discussion</td>
<td>59</td>
</tr>
<tr>
<td>Chapter 5 Perceived Vulnerability of NBT System to Social Change</td>
<td>60</td>
</tr>
<tr>
<td>5.1 Introduction</td>
<td>60</td>
</tr>
<tr>
<td>5.2 Tourism Stakeholders’ Perspectives on Social Change</td>
<td>63</td>
</tr>
<tr>
<td>5.2.1 Vulnerability due to Socio-economic and Land-use Change</td>
<td>63</td>
</tr>
<tr>
<td>5.2.1.1 Road development</td>
<td>63</td>
</tr>
<tr>
<td>5.2.1.2 Migration</td>
<td>69</td>
</tr>
<tr>
<td>5.2.1.3 Globalization of Local Economy</td>
<td>72</td>
</tr>
<tr>
<td>5.2.2 Vulnerability Due to Political Instability</td>
<td>74</td>
</tr>
<tr>
<td>5.2.2.1 Risk Governance Capacity</td>
<td>77</td>
</tr>
<tr>
<td>5.3 Chapter Summary</td>
<td>78</td>
</tr>
<tr>
<td>Chapter 6 Perceived Vulnerability of NBT System to Climate Change</td>
<td>81</td>
</tr>
<tr>
<td>6.1 Introduction</td>
<td>81</td>
</tr>
<tr>
<td>6.2 Tourism Stakeholders’ Understanding of Climate Change</td>
<td>81</td>
</tr>
<tr>
<td>6.3 Perceived Exposure to and Impacts of Climate Change</td>
<td>84</td>
</tr>
<tr>
<td>6.3.1 Warmer Winters</td>
<td>85</td>
</tr>
<tr>
<td>6.3.1.1 Reduced Water Availability</td>
<td>87</td>
</tr>
<tr>
<td>6.3.2 Cold, Wet and Unsettled Spring</td>
<td>90</td>
</tr>
<tr>
<td>6.3.3 Intense and Erratic Summer Monsoon</td>
<td>91</td>
</tr>
<tr>
<td>6.3.4 Seasonal Anomalies</td>
<td>95</td>
</tr>
<tr>
<td>6.3.5 Interim Summary</td>
<td>99</td>
</tr>
<tr>
<td>6.4 Perception on Adaptation of NBT to Climate Change</td>
<td>101</td>
</tr>
<tr>
<td>6.4.1 Attitude</td>
<td>101</td>
</tr>
</tbody>
</table>
6.4.2 Actions ................................................................................................................ 105
6.4.3 Adaptive Capacity .............................................................................................. 108
6.5 Chapter Summary ....................................................................................................... 112
Chapter 7 Conclusion and the Way Forward ......................................................................... 115
7.1 Research Overview ..................................................................................................... 115
7.2 Overall Vulnerability of NBT Supply System in Lower Mustang .................. 116
7.3 Implications of Study Findings ................................................................................ 120
  7.3.1 Social and Environmental Implications ............................................................ 120
  7.3.2 Management Implications ................................................................................. 121
7.4 Contribution of the Study ........................................................................................... 122
7.5 Priorities for Future Studies ....................................................................................... 122
References .......................................................................................................................... 125

Appendices .......................................................................................................................... 137

Appendix A: Interview Guide .................................................................................................... 138
Appendix B: Stakeholders’ Profile ........................................................................................ 141
Appendix C: Research Information Sheet ................................................................................. 143
Appendix D: Consent Form ........................................................................................................ 145
List of Tables

Table 2.1: Temperature and precipitation projections for Nepal ............................................... 17
Table 3.1: Socio-economic parameters of Mustang................................................................. 33
Table 3.2: The number of accommodation services in lower Mustang .................................... 40
Table 3.3: Monthly tourist arrivals in Mustang ....................................................................... 42
Table 3.4: The 5-year record of tourists (from SAARC nations and primarily Indian) arriving in lower Mustang .................................................................................................................. 43
Table 4.1: The qualitative research approach for the study ...................................................... 50
Table 5.1: Seasonal calendar of lower Mustang ...................................................................... 61
Table 5.2: Stakeholders’ typology and their involvement in multiple economic activities .... 62
Table 5.3: Tourist arrivals in Nepal and lower Mustang during and after conflict periods .... 76
Table 6.1: Perceived experience of natural disaster related events in lower Mustang .......... 93
Table 6.2: Perceived constraints to respond to climate change impacts adaptation .......... 103
Table 6.3: Strategies and actions taken to respond to the changing climatic condition .... 106
Table 6.4: Adaptive Capacity of the Tourism Stakeholders ................................................... 108
List of Figures

Figure 2.1: The NBT supply system ............................................................................................ 14
Figure 2.2: Trend of annual average maximum temperature of Nepal (1975-2006) ................. 15
Figure 2.3: Annual average maximum temperature trend in Nepal (1974-1994) ..................... 15
Figure 2.4: Regional annual average maximum temperature trends for the period 1977-94 (°C per year) ......................................................................................................................................... 16
Figure 2.5: Tonnes of CO₂ emission per capita........................................................................... 16
Figure 2.6: Examples for each of the four categories of vulnerability factors classified according to the dimensions sphere and knowledge domain ..................................................... 21
Figure 2.7: Climate Variability and Direct Experiential Perception .......................................... 25
Figure 3.1: Map of Annapurna Conservation Area and lower Mustang ................................... 31
Figure 3.2: Land use map of lower Mustang ............................................................................... 32
Figure 3.3: Demographic distribution in lower Mustang ........................................................... 34
Figure 3.4: Rainfall map of lower Mustang ................................................................................ 38
Figure 3.5: A map showing the planned Kali Gandaki Highway in Mustang ......................... 41
Figure 3.6: Seasonal tourist arrival figures for lower Mustang .................................................. 44
Figure 4.1: Vulnerability assessment framework of Nature Based Tourism supply system to climate change based on tourism stakeholders’ perspectives..................................................... 48
Figure 5.1: Map of ACT route over which the Beni – Jomsom and Besishahar – Manang Roads have been constructed ................................................................................................................... 63
Figure 5.2: Changing means of transportation in lower Mustang .............................................. 66
Figure 6.1: Impact pathways of climate change to NBT system based on tourism stakeholders’ perspectives ............................................................................................................ 85
Figure 6.2: Three decade maximum winter temperatures of Jomsom ....................................... 86
Figure 6.3: Three decade minimum winter temperatures of Jomsom ....................................... 86
Figure 6.4: NASA’s Aqua satellite map showing a glimpse of large scale forest fires in the Himalayas of Nepal. ...................................................................................................................... 90
Figure 6.5: Precipitation transect for lower Mustang ................................................................. 91
Figure 6.6: Shift in NBT seasonality perceived by the tourism stakeholders. ............................ 96
Figure 6.7: Priority issues for the NBT supply system based on tourism stakeholders’ perspectives ................................................................................................................................. 101
Figure 6.8: Tourism stakeholders’ perspectives on vulnerability of NBT supply system in lower Mustang. ........................................................................................................................... 117
List of Plates

Plate 4.1: A Mukhiya .................................................................................................................... 54
Plate 4.2: A Hotel owner ........................................................................................................... 54
Plate 4.3: A Porter ......................................................................................................................... 54
Plate 5.1: Mule caravan – the famous ‘Mountain Trucks’ of Mustang ..................................... 67
Plate 5.2: Jeeps being airlifted to Mustang .................................................................................. 67
Plate 5.3: Jeep ‘station’ at the centre of the Puthang village ...................................................... 67
Plate 5.4: Jeep ‘station’ at the entry point of Muktinath ................................................................ 67
Plate 6.1: Event organized during the World Environment Day, 2009 and ACAP’s Conservation Day at Lete ............................................................................................................. 82
Plate 6.2: Women gathered at the Event ...................................................................................... 82
Plate 6.3: Children watching the event from the rooftop of the community building .......... 82
Plate 6.4: The last heavy snowfall that fell in Puthang village in 2006 ........................................ 87
Plate 6.5: The last heavy snowfall that fell in Tukuche village in 2006 ....................................... 87
Plate 6.6: Year 2008 forest fire in the forest of Sauru village ......................................................... 89
Plate 6.7: Year 2009 forest fire above the Thini village ............................................................... 89
Plate 6.8: Overlooking the villages of Larjung, Kobang and Khanti and the Lhankyu River that caused a catastrophic flood in 2002 .................................................................................... 94
Plate 6.9: Flat mud-roof houses in Marpha .................................................................................... 95
Plate 6.10: Newly built hotels in Khanti with CGI sheet metal roof ................................................. 95
Plate 6.11: Kangyur (the religious book) being tied at the back of a woman ............................... 107
Plate 6.12: People carrying Kangyur along the village ................................................................. 107
Chapter 1
Introduction: An Overview of the Study

1.1 Introduction

Recently, increased warnings of the effects of changes caused by climatic and non climatic factors (IPCC, 2001; IPCC, 2007a) in mountain destination areas have been reported by researchers worldwide. Gössling and Hall (2006) stated that climate change is one of the highest environmental risks for the development of tourism in the century. This is because “climate variations and changes are beginning to have effects on many other natural and human systems” (IPCC, 2007a, p. 9). “If the worst scenarios are realized, that would mean prioritizing climate change” (Palosuo, 2009, p.12) and other non climate change factors above all other current concerns. The reason is the relationship between tourism, climate change and sustainable development (Gössling, Hall & Scott, 2009) is intricate posing a significant threat for destinations and their stakeholders whose livelihoods depend on tourism.

Nature based tourism (NBT) is an important livelihood, a major contributor of the economy of the lower Mustang region. This high Himalayan region is an important destination within the Annapurna Conservation Area (ACA) and falls within one of the world’s 10 most popular trekking destinations, known as the Annapurna Circuit Trek (ACT) (Schnaiberg, n.d.; McCharles, 2006, December 27). Annually, on average it receives 40 percent of the tourists visiting the ACA (NTNC-ACAP Tourist Checkpost, 2006). The synergy between NBT and the region is mutually beneficial, the former relying on a wide range of natural resources for its operation, whereas the latter relies on the incentives of NBT for nature protection and livelihood opportunities. The NBT of lower Mustang provides the best example of how participatory management assists not only to improve livelihood, but also to conserve the environment and preserve the culture.

However, NBT is under pressure due to rapid changes happening in lower Mustang. Local stakeholders responsible for the management of tourism have been subjected to the impact of several changes, such as socio-economic change (e.g., road development, increased in migration and demographic dynamics), land use change (conversion and fragmentation of natural habitats, hydrological change and biodiversity loss), political change (political
instability, governance, capacity of the stakeholders) and climate change. The operation of the Beni-Jomsom road, most importantly within the protected area, is likely to have many impacts because lower Mustang is an area of potential high biodiversity and also has the areas of concern due to fragile/degraded ecosystems identified by the Biodiversity Conservation Data Project in 1994 (Poel Van der, 2006). In terms of climate change, warming of mountainous regions (Beniston, 2003; Nyaupane & Chhetri, 2009; Shrestha et al., 1999; Walther et al., 2002) is becoming a great concern for the scientists and policy makers of Nepal. Several studies by OECD (2003), Regmi and Adhikari (2007) and Shrestha et al. (1999) indicate that Nepal’s temperature is increasing with a high rate of warming observed in the high-elevation regions. Lower Mustang is no exception. Temperature warming is accelerating, more rapidly in mountainous region of ACA (Nyaupane & Chhetri, 2009), making the place, the people and their livelihood vulnerable to such change (NTNC, 2006).

As Mustang falls within the high Himalayan mountain system [the world’s 7th and 10th highest mountains, Dhaulagiri (8,137 m.) and Annapurna (8,161 m.)], the interplay of climate change with the multiple stressors above, poses both opportunities and risks to the NBT system. For instance, climate change is predicted to extend summer season and warmer winter which may mean extended season and tourism business in the Mustang region. Higher levels of visitation brought about by the extended warm weather tourism season (demographic changes in tourism market) may have several implications (Scott & Jones, 2006) on NBT management in this region. There are other imminent risks associated with climate change impact which could affect the destination’s appeal, transportation infrastructure and operations, the resource base (natural and human), the sustainability of tourist facilities and the destinations (Becken & Hay, 2007).

The central question of this study is to understand stakeholders’ perspectives on various vulnerability contexts for NBT supply system in lower Mustang, with special emphasis on climate change. The thesis, therefore, aims to explore the stakeholders’ perceptions of the impact of and response to climate change. It then analyses the interplay of climate change with other major factors influencing the system.

Lower Mustang has been selected because the area is socio-economically, politically and climatically vulnerable. Socio-economically, the area is characterized by its peripheral status with a sparse population and limited resources to support year-long livelihood options. The structural changes brought by the road development is transforming lower Mustang from an
isolated remote mountain area characterized by a subsistence economy (e.g., niche NBT tourism activities, farming/horticulture and trade) to a diverse tourism and cash-based economy (commercial agriculture and horticulture). Politically, the recent transformation of the country from a kingdom to a republic, the ongoing political instability and the destabilization of the power structure, has resulted in a power vacuum, affecting the statutory and management roles of the tourism stakeholders within the area.

The various assets of the NBT supply system (tourism, human and natural) have close linkages to and reliance on climatic conditions. Therefore changing climate and weather can significantly impact the system and its stakeholders. Despite the economic significance of tourism, the important influence of climate on tourism and its resources (Dudley & Stolton, 2003); the prediction of the potential impacts of climate change on the environment and the community, the susceptibility of the mountain PAs and NBT to climate change (Nyaupane & Chhetri, 2009; Scott & Johnes, 2006), studies on the effects of climate change for the NBT of lower Mustang region have not been carried out. Therefore lower Mustang presents unique challenges to and opportunities for climate change research.

Given lower Mustang’s socio-economic relationship with tourism, the paucity of climate perception studies and the importance of tourism stakeholders’ perceptions in understanding the vulnerability of NBT, this area has been selected to investigate how the stakeholders perceive climate change and are equipped to deal with it. The study was conducted in seven of nine Village Development Committees (VDCs), the lowest autonomous political units of lower Mustang administered by Jomsom UCO.

The purpose of this chapter is to describe the context behind the formulation of this study both personally and for the research problem. Section 1.2, enumerates the scope, aim and objectives and contribution of the study. In section 1.3, I will define the key terminology used in this study, followed, in section 1.4, by a brief overview of the structure of the thesis.

1.2 Rationale for Vulnerability Assessment of NBT in lower Mustang

My reasons for choosing lower Mustang and my interest in looking at the vulnerability contexts of NBT for my thesis are threefold:

---

1 From the tourism perspective, Mustang is divided into two areas, the Upper Mustang and Lower Mustang. Lower Mustang is served by Jomsom Unit Conservation Office (UCO) of Annapurna Conservation Area Project.
1. My association with the area while working for the Annapurna Conservation Area Project (ACAP) as Tourism Officer.

Hall (1994), in his book *Tourism and Politics: Policy, Power and Place* argued that the choice of tourism topics and research methods is not solely the result of a rational and objective decision-making process, as usually purported, but is highly political in itself. I acknowledge that one of the strongest reasons in deciding to choose lower Mustang and the topic is driven by the fact that before studying at Lincoln University, New Zealand, I was working as a Tourism Officer in ACAP.

I joined ACAP in December 2003, after having worked for an environmental NGO in Kathmandu for three years. As part of the orientation programme, my first assignment was to visit the working areas of ACAP. When I first visited lower Mustang in 2004, I was intrigued by the serene mountain landscapes, clustered traditional villages, and trekking trails meandering through the Kali Gandaki Gorge (the world’s deepest gorge) characterised by the intermittent patterns of stone paved, muddy trails and the walk through majestic riverbeds of the Kali Gandaki River. During that time, there were some motorcycles and the tractors plying the trails above Lete village. Within three years, the area was transformed from a peripheral destination area to an area with various means of transport hustling and bustling along the road. When I visited this area on several occasions during 2005-2007, I felt that I was witnessing the last chapter of the history of Mustang, the place that once was a mystique and serene mountain region that many nature loving tourists enjoyed coming to for trekking and mountaineering; essentially because of the changing landscapes, lifestyles and livelihood of the people.

With the changes happening, lower Mustang intrigued me both personally and professionally, and remained with me as I moved away to pursue my academic career. I took the opportunity of fulfilling my interest of understanding the issues and implications of changes in tourism dynamics and people’s livelihood, the issues that first inspired me through this thesis work.

2. The vulnerability of NBT to climate change in the lower Mustang region has not been assessed.

Most contemporary research on links between climate change and Protected Areas (Pas) in Nepal has focussed on the threats posed to mountain glaciers, agriculture and biodiversity...
However, the vulnerability of the NBT sector of PAs to climate change and vice versa (Scott et al., 2002, Scott & Jones, 2006), with the exception of the recent work by Nyaupane and Chhetri (2009), has not been assessed in Nepal. Nyaupane and Chhetri (2009) assessed the vulnerability aspects of NBT of the three most popular PAs, spread in three physiographic zones of Nepal, using a broad conceptual framework based on mountain specificities as indicators. The study provided a generalized overview of the regional perspective of assessing the impacts of climate change on NBT (Nyaupane & Chhetri, 2009). As the impacts of climate change are expected to combine differently as a function of the characteristics (the mountain specificities) of each destination, investigating the impacts from the local perspective, assessing the specific vulnerability contexts and data are very important (IPCC, 2007a). The proposed study will provide an opportunity to locally explore current knowledge of climate change impacts in tourism.

3. Understanding the vulnerabilities and impacts depends on the awareness and the attitudes of the stakeholders and their adaptive capacity to respond to climate change.

Limited research on the vulnerability assessment of NBT to climate change in Nepal, let alone ACA or the Mustang region, could lead to a possible lack of understanding by the tourism stakeholders of the issues faced from climate change and a policy towards management of the NBT in the region. Literature on stakeholders’ perceptions suggested that because people are not well informed of the causes and impacts of climate change (Keskitalo, 2004) there is a huge difference between the scientists/experts/policy makers and the lay person in the way they perceive climate change and the vulnerability. The greatest challenge is that climate change, being a global issue, the approach of dealing with the agendas of such change very often is top down. This most contentious problem creates barriers to participation due to lack of accessibility to information and resources (finance and technical) (see Deanwood, 2002; Lorenzoni, 2007), resulting in isolation of local stakeholders from broader social networks as well as the loss of opportunities to take part in an informed decision-making process (Becken & Hay, 2007).

The dynamism of changes brought about by the multiple stressors, including climate change, will have greater impact on local tourism stakeholders given that they are most vulnerable (socially, technologically and financially) to climate change impacts when responding to such impacts whether by mitigation or adaptation. Similarly, the multiple stressors also result in a complex set of interactions between tourism, the climate, the environment and society,
making it difficult to isolate the direct observed impacts of climate change upon tourism (Rosenzweig, et al., 2007). This highlights the need for the development of grassroots and place-based knowledge, as well as assessing the capacity for a more realistic understanding of the impacts of climate variability and change in tourism.

1.2.1 Thesis Aim and Objectives

The overall aim of this thesis is to:

Understand stakeholders’ perspectives on various vulnerability contexts for NBT in lower Mustang, with special emphasis on climate change.

I plan to achieve this aim through the following set of objectives:

• review the literature on vulnerability, nature based tourism, climate change and public understanding of climate change;
• investigate tourism stakeholders’ perceptions of and responses to the impacts of climate change;
• analyse the vulnerability of NBT to climate change impacts from the tourism stakeholders’ perspectives; and
• explore the interplay of climate change with other major factors influencing NBT in the Mustang region.

The thesis is particularly undertaken to address the following questions:

• What are the dimensions of vulnerability in NBT in ACA in general and lower Mustang in particular?
• To what extent is climate change documented in ACA and/or lower Mustang?
• What perceptions do stakeholders have on the vulnerability of NBT to climate change?
• How are the tourism stakeholders responding to climate change impacts?
• How does climate change feature in the context of a wide range of vulnerabilities to NBT in lower Mustang?

1.2.2 Importance of the Thesis and Its Contribution
This study is the first to research stakeholders’ perceptions of vulnerability of NBT to climate change in the lower Mustang region of ACA. The absence of empirical study provides an opportunity to explore the perceptions and impacts of climate change from tourism stakeholders’ perspective. Although Nepal’s share in the global emission of greenhouse gases is negligible (Lohani, 2007), the global nature of climate change impact makes it an increasingly important issue affecting tourism development and management (Becken & Hay, 2007) within ACA. Given the environmental, economic and social value of NBT, its role in sustainable development and a strong relationship with climate, the vulnerability of NBT in lower Mustang, in the face of the global climate change, deserves special attention.

The vulnerability assessment study through stakeholders’ perceptions distinguishes it from other approaches in that it strives to create direct interaction with the individual bringing several different groups together (Carina & Keskitalo, 2004). Understanding the awareness of, impact on and responses to climate change provide tangible meanings and perspectives of the issues to make informed decisions. Though the study certainly does not give the entire picture, understanding perceptions, in particular how people who are at the grassroots understand climate change and what issues related to climate change exist and how it is impacting their livelihood provides a first “on-the-ground” perspective on the actual vulnerability status of NBT to multiple stressors. The study should provide a fundamental basis for planning and managing tourism in Mustang in the face of global climate change impacts and adaptation.

1.3 Definition of Terms

The key terms used in this study are:

Adaptive capacity: The ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damage, to take advantage of the opportunities, or to cope with the consequences (IPCC, 2001).

Climate change: Climate change refers to the change in the state of the climate that can be identified by changes in the mean/or the variability of its properties, and that persists for an extended period, typically decades or longer (IPCC, 2007b). Climate change may be due to natural variability or persistent anthropogenic changes, in the composition of the atmosphere or in land use (IPCC, 2007b). This usage differs from that in the United Nations Framework
Convention on Climate Change (UNFCCC), which defines climate change as: “a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods” (IPCC, 2001; 2007b, p. 78).

**Climate change impacts:** The consequences of climate change on natural and human systems. Depending on the consideration of adaptation, one can distinguish between potential and residual impacts, [……] (Füssel & Klein, 2006).

**Climate variability:** Climate variability refers to variations in the mean state and other statistics (such as standard deviations, statistics of extremes, etc.) of the climate on all temporal and spatial scales beyond that of individual weather events (IPCC, 2007b). Variability may be due to natural internal processes within the climate system (internal variability), or to variations in natural or anthropogenic external forcing (external variability) (IPCC, 2007b).

**Exposure:** The nature and degree to which a system is exposed to significant climatic variations (Füssel & Klein, 2006) or other factors.

**NBT:** Tourism that is directly dependent on the use of natural resources in a relatively undeveloped state, including scenery, topography, water features, vegetation and wildlife (Ceballos-Lascurain, 1996). NBT according to Newsome, Dowling and Moore (2005) broadly categorised this general definition producing the three dimensions - **tourism in the natural environment** (adventure tourism), **about the environment** (nature based tourism) and **for the environment** (ecotourism).

**NBT supply system:** Tourism supply is a mixture of different types of goods and services (Jenkins & Pigram, 2003, p. 489), as well as facilities/services such as accommodation, restaurants, transport other natural (Pradhan, 2008) and cultural resources.

**Sensitivity:** Sensitivity is the degree to which a system is affected, either adversely or beneficially, by climate variability of change. The effect may be direct [……] or indirect […..] (IPCC, 2007b).

**Stakeholders:** Refers to those individuals or institutions that have a significant interest in NBT service operation in lower Mustang, or decisions made concerning its management.
**Vulnerability:** Vulnerability, in general, refers to the likelihood of injury, death, loss, disruption of livelihood or other harm, manifested in the form of risks, as a result of environmental shocks or harm resulting from social changes (O’Brien, Eriksen, Nygaard & Schjolden, 2007).

### 1.4 Structure of the Thesis

The thesis is in seven chapters. Part A, which includes Chapters 2 and 3, sets the stage for vulnerability assessment by discussing the vulnerability context of NBT to climate change. Chapter 2 reviews the literature on the NBT supply system and climate change and the two main concepts, the vulnerability and public understanding of climate change. The literature on vulnerability examines the various definitions and conceptualization of vulnerability and its growing importance in assessing climate change impacts and adaptation, followed by a brief examination of the climate change vulnerability assessment framework. It also reviews the literature on public understanding of and response to climate change.

Chapter 3 describes the study area, the lower Mustang region, with information particularly about the geo-morphology and socio-economy. Then there is an elaborate account of the NBT supply system, its governance contexts and tourism stakeholders. This chapter provides references for readers who are not familiar with the area and also sets the background for contextualizing the case.

In part B, which consists of Chapter 4, I describe the methods used to formulate the vulnerability assessment framework for the case study and the application of the qualitative research method for gathering the information. For this, tools such as in-depth interviews, direct observation and conversations with individuals and experts are used as the primary data source. Photo documentation and information from books, journals, reports, newspaper cuttings, et cetera, are the secondary data for this study. This chapter also discusses various methodological and ethical issues encountered during data collection.

Part C contains the results and discussion and examines the contextual vulnerability of the NBT supply system through the tourism stakeholders’ perspectives in the light of climate change. It comprises two chapters, 5 and 6, which discuss the study’s findings. Chapter 5 elaborates the social dimension of vulnerability and Chapter 6 provides the stakeholders’
perspectives on the vulnerability aspects of NBT supply system to climate change and their response capacity.

Finally, Chapter 7, the concluding chapter, synthesizes the key findings and arguments of the study, followed by the brief outline of the implications of these findings and the policy approach. The thesis concludes by discussing the contribution and providing direction for future research scope.
PART A: Background

Chapter 2

Researching Vulnerability Assessment of NBT supply system to Climate Change: Stakeholders’ Perception

2.1 Introduction

The purpose of this thesis is to explore the dimensions and determinants of the drivers of change among tourism stakeholders at the grassroots and the most vulnerable community to the impacts of climate change and adaptation. This chapter therefore examines NBT, climate change and the two main concepts, vulnerability and public perception of climate change, to set the study of the vulnerability of nature based tourism to climate change in lower Mustang.

The chapter is divided into five sections. The first section reviews the literature on NBT and its supply system. Section two discusses climate change in Nepal with a special focus on the mountains. Section three explores how climate change impacts NBT. Section four reviews the various definitions and conceptualisation of vulnerability followed by a brief review of the different approaches used in a vulnerability assessment framework. The basic ideas of contextual vulnerability assessment frameworks used extensively in climate change vulnerability assessment are examined to integrate this theoretical perspective into the study. Section five examines the dimensions and determinants of the public understanding of climate change.

2.2 Overview of the Nature Based Tourism and Supply System

NBT is a rapidly growing sector of the tourism industry worldwide. According to TIES (2000), the annual growth rate for this sector ranged from 10 - 30 percent, compared with 4.3 percent for other parts of the tourism sector. A study by Balmford et al. (2009) showed that, between 1992 and 2006, visitor numbers in 15 of the 20 countries studied were growing, indicating a rising trend of visiting NBT destinations. The demand for such travel is motivated totally or partly by interest in the natural, wilderness, cultural and authentic experiences where visits combine education, recreation and often adventure (Laarman & Gregersen, 1996).
NBT is a contested term with no agreed definition (Goodwin, 1996). Ceballos-Lascurain (1996) defined NBT as that tourism directly depending on the use of natural resources in a relatively undeveloped state, including scenery, topography, water features, vegetation and wildlife. Newsome, Dowling and Moore (2005) elaborated and categorized this general definition and produced three dimensions of tourism in the natural environment; i.e., *tourism in the environment* (adventure tourism), *about the environment* (nature based tourism) and *for the environment* (ecotourism). In this study, NBT represents all three dimensions and the activities that focus on natural attractions at the destination as the major reason why people visit (Greiner, 1998). It includes, but is not limited to, trekking, mountaineering, camping, hiking, wildlife viewing, bird watching, rafting, kayaking and mountain biking.

Despite its increasing importance, tourism has attracted relatively little attention in the literature on (Sinclair, 1998) conceptual and theoretical research on the supply component of tourism activities. With the advent of qualitative research in the 1990s, some geographical research on supply issues began to challenge the positivist approach to spatial analysis with reference to tourism supply (Hall & Page, 2006). The way in which tourism supply is produced by the stakeholders (public or private sectors) is an important issue. Similarly, the system produced has value attachment in terms of environmental, economic and cultural and aesthetic values and therefore full recognition should be given to the interplay of social, economic and political factors that shape the NBT production system.

Since the beginning of the 1980s, system thinking in tourism has been applied by only a few researchers (Carlsen, 1999). Leiper (1979) was the first to use general systems theory to develop a framework for understanding and managing tourism. According to Leiper's approach, the tourism system comprises four geographic (such as the traveller-generating region, the transit route region, the tourist destination region) and social elements (such as tourists themselves and the tourism operators). The interactions in the three geographic areas take place within broader human, socio-cultural, economical, technological, physical, political and legal settings or 'environments' that influence the social and geographic elements of tourism (Carlsen, 1999). Carlsen also suggested that it is an open system in that it responds to changes in the social, natural and economic environment and is evolving towards an increasing state of complexity.
The NBT supply system for this thesis is considered as a mixture of different types of goods and services (Jenkins, & Pigram, 2003, p. 489), as well as facilities/services such as accommodation, restaurants, transport and other natural (Pradhan, 2008) and social elements. As shown in Figure 2.1, it can be seen as a part of the complex human – environment relationship that is more or less manipulated to secure the production of the goods valuable to man (Kvaloy & Sandvik, 1992) or a system in which the dynamics of the natural, tourism and human systems are interlinked. The natural system forms the basis of the key natural resources such as mountains, landscapes and biological resources (flora and fauna) for tourism and agricultural resources for the human system. Within the natural system, climate is a key ingredient that influences the natural, tourism and human assets. The tourism system is a composite of service/facilities and activities that relies on both natural and human systems. The human system, which includes people and their institutions, is structured and exercises rights and power in order to mobilise resources for fulfilling livelihood needs (agriculture/trade beside tourism) and social needs (promoting and preserving heritage). These human assets are also a key NBT supply element. Alternately, the economic benefit generated through the operation of tourism facilities, services and activities provides incentives for both natural and human systems thereby facilitating nature conservation, socio-economic development and heritage preservation.
### Natural System

#### Physical Resources
- Geomorphology (E.g. Mountains, Landscapes, Water)
- Climate

#### Biological Resources
- Flora and Fauna

### Natural Assets

<table>
<thead>
<tr>
<th>Tourism System</th>
<th>Human System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facilities/Service</td>
<td>Socio-economic Resources</td>
</tr>
<tr>
<td>Accommodation</td>
<td>- Tourism</td>
</tr>
<tr>
<td>Restaurants</td>
<td>- Agriculture</td>
</tr>
<tr>
<td>Campsites</td>
<td>- Trading</td>
</tr>
<tr>
<td>Shops</td>
<td></td>
</tr>
<tr>
<td>Public Utilities (e.g. transportation networks)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Activities</th>
<th>Socio-cultural Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trekking</td>
<td>- People and Institution</td>
</tr>
<tr>
<td>Mountaineering</td>
<td>- Heritage</td>
</tr>
<tr>
<td>Pilgrimage</td>
<td>(Religious/Traditional Buildings)</td>
</tr>
<tr>
<td>Bird Watching</td>
<td></td>
</tr>
</tbody>
</table>

| Tourism Assets | Human Assets |

**Figure 2.1: The NBT supply system**

### 2.3 Climate Change in the Context of Nepal

Being a Himalayan country, climate change is becoming an issue of great concern for the scientists and policy makers of Nepal. Figure 2.2 shows that in the past 32 years, Nepal’s temperature has increased by 1.8°C.
Although the average increased temperature in Nepal was approximately 0.06°C per year (Regmi & Adhikari, 2007; Shrestha et al., 1999), the warming was more pronounced in the high altitude regions of Nepal (OECD, 2003; Regmi & Adhikari, 2007), such as the middle mountain and the Trans Himalaya (Shrestha et al., 1999) (see Figure 2.3).

It is also interesting to note that the winter warming season is more pronounced in the Himalaya and Trans Himalayan region compared with mid mountain or all Nepal average maximum temperatures (see Figure 2.4).
Figure 2.4: Regional annual average maximum temperature trends for the period 1977-94 (°C per year)

Although Nepal’s greenhouse gases (3.21 Mt of CO₂) and per capita emissions (0.11 t CO₂/capita) are negligible (see Figure 2.5), the country is most affected by the impacts of climate change (International Energy Agency, 2009; Webersik & Thapa, 2008). A study by the OECD (2003) showed a significant and consistent predicted increase in temperatures for Nepal for the years 2030, 2050 and 2100 across various climate models and that increases in temperature will be larger for the winter months than the summer months.

Figure 2.5: Tonnes of CO₂ emission per capita

(Source: International Energy Agency, 2009)
The assessment of 15 Global Climate Models (GCMs) for Nepal indicated a potential increase in mean annual temperatures but the projected mean annual precipitation fluctuated (see Table 2.1) (NCVST, 2009). However, regional climate models (RCM) produced by the Indian Institute of Tropical Meteorology (IITM) for the Himalayan range and Tibetan Plateau, indicated decrease in monsoon precipitation of up to 20 percent by the end of the century (Shrestha, 2008).

Table 2.1: Temperature and precipitation projections for Nepal

<table>
<thead>
<tr>
<th>Projected Year</th>
<th>Mean Annual Temperature</th>
<th>Multi-model Mean</th>
<th>Mean Annual Precipitation</th>
<th>Multi-model Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>2030</td>
<td>0.5 – 2.0</td>
<td>1.4</td>
<td>-34 to +22%</td>
<td>0%</td>
</tr>
<tr>
<td>2060</td>
<td>1.7 – 4.1</td>
<td>2.8</td>
<td>-36 to +67%</td>
<td>+4%</td>
</tr>
<tr>
<td>2090</td>
<td>3.0 – 6.3</td>
<td>4.7</td>
<td>-43 to +80%</td>
<td>+8%</td>
</tr>
</tbody>
</table>

(Source: NCVST, 2009)

All south Asia is projected to warm by at least 1°C by the end of the century but high warming of 3.5 - 4°C is projected for western Nepal Himalayas (Shrestha, 2008). The warming is projected to be more receding or melting of the Himalayan glaciers and disruption in the annual monsoon (IPCC, 2007a; OECD, 2003). Due to the higher evaporation and decreased glacier mass, climate change is likely to exacerbate water resource stresses in most of Asia (high confidence) (IPCC, 2007a). Climate change also involves changes in the frequency and magnitude of extreme weather events, particularly combined with intensified monsoon circulations (Shrestha, 2008). A growing incidence of floods and droughts as a result of changes in the monsoon precipitation is likely to occur in Asia (Shrestha, 2008).

In most parts of Asia, climate change is expected to exacerbate threats to biodiversity resulting from land-use/cover change and population pressure (high confidence) (IPCC, 2001). The Third Assessment Report of IPCC highlights that non climatic stressors such as the socioeconomic, land-use, and environmental changes are important for characterizing the sensitivity of systems (NBT system in this study) to climate change, their vulnerability, and the capacity for adaptation (IPCC, 2001). The resilience of many ecosystems (their ability to adapt naturally) is likely to be exceeded by 2100 by an unprecedented combination of climate change and associated disturbances (e.g., flooding, drought), and other global change drivers (e.g., land-use change, pollution, over-exploitation of resources) (high confidence) (IPCC, 2007a). The Fourth Assessment Report (FAR) also stated the possibility of climate change
intensifying environmental pressures (e.g., water/air pollution and land degradation) and impinging on sustainable development in many developing Asian countries (IPCC, 2007a). It is also predicted (reasonably high confidence) that the warming trend observed in recent decades will continue in the 21st century and that the summer monsoon will intensify (moderate confidence) thereby increasing the risk of flooding and landslides.

Mountains represent unique areas for the detection of climatic change and the assessment of climate change impacts (Beniston, 2003). This is because climate changes rapidly with height over relatively short horizontal distances (Whiteman, 2000). Due to their inherent characteristics of rapid systematic changes in climate parameters (especially temperature and precipitation) (Becker & Bugmann, 1997, p.7), the mountain regions are very susceptible to a rapidly changing climate. Because the high mountain regions already show the signs of greater warming effects (Shrestha, 2008), several studies have been carried out to assess the vulnerability of glaciers and the biodiversity to climate change (ICIMOD, 2007; WWF-Nepal, 2005).

2.4 Nature Based Tourism in the Face of Climate Change

Climate is a principal resource for tourism because it co-determines the suitability of locations for a wide range of tourist activities. Climate also drives the global seasonality in tourism demand and has an important influence on operating costs, such as irrigation, food and water supply, and insurance (Simpson et al., 2008). It also affects the resources that are critical attractions such as wildlife, biodiversity, water levels and quality, snow conditions and glacier extent (Gössling, Hall & Scott, 2009). Climate change has the potential to permanently change the attraction and the value of the destinations (Marshall, Marshall, Abdulla, Rouphael, & Ali, 2009); particularly those relying on natural resources and mountains are more at risk (Fischer, 2007).

It is also anticipated that the integrated effects of climate change (both shifts in climatic means and extremes), climate-induced environmental change (Gössling, Hall & Scott, 2009), and drivers of non climatic changes such as societal change, land use-land cover changes (IPCC, 2007a), and demographic changes will have far-reaching impacts on tourism destinations around the world (Gössling, Hall & Scott, 2009). Several international experts consistently identified developing countries such as Asia as the most at risk tourism
destinations for the mid to late 21st century (Gössling, Hall & Scott, 2009). The FAR identified a range of anticipated impacts of climate change that threaten the long term sustainability of tourism in mountain areas (IPCC, 2007a). The changes in a number of weather extremes as a result of projected climate change, including higher maximum temperature and more hot days, more intense precipitation and floods, and longer and more severe droughts, are expected to exacerbate water resource stresses, affect agriculture and exacerbate threats to biodiversity (IPCC, 2007a). Such changes will affect tourism in several ways such as damage to tourism infrastructure, impact on service operation and safety, impact on resources and economy and business interruptions. Mountains are particularly sensitive from both climate change and climate induced environmental change, as are NBT market segments (Nyaupane & Chhetri, 2009; Scott, 2006; Scott & Johnes, 2006). Although climate is not the only factor that tourists weigh, it is one of the most important considerations for a range of activities tourists desire (Nyaupane & Chhetri, 2009).

The FAR also argued that the roles of non-climatic stressors such as socio-economic and regional land-use change are more important in determining outcomes than climate change (IPCC, 2007a), as they drive the projected changes in future emissions and climate change. Furthermore, they also influence the policy options available to respond to climate change (IPCC, 2007a). The UNDP Adaptation Policy Framework guidelines that analysed the current and projected socio-economic conditions (Malone & La Rovere, 2005, as cited in IPCC, 2007a) advocated the use of indicators (such as demographic, socio-economic, natural resource use, governance and policy) that characterized the socio-economic conditions and prospects (IPCC, 2007a), which influence climate change impacts and the adaptation capacity of the community. Climate change also poses a risk to future economic growth and to the political stability of some nations (IPCC, 2001).

Potentially, climate change can alter the conditions for the production (WBGU, 2008) and supply of the NBT system. Climate constitutes an important part of the environmental context in which all tourism takes place and because tourism is a voluntary and discretionary activity, participation depends on perceived favourable conditions (Perry, 2005). Therefore the interrelationship between tourism, development (in this case socio-economic and political change) and climate change are posing (Gössling, Hall & Scott, 2009) significant management challenges and policy dilemmas for stakeholders. The literature reviewed highlights that tourism is a climate sensitive sector, yet as stated by de Freitas (2003, p. 45) very few researchers have examined the relationship between climate and tourism. As a
consequence of this, the vulnerability of tourism industries and destinations to climate variability remains largely unknown.

2.5 Vulnerability Assessment Conceptual Approach

2.5.1 Defining Vulnerability

Vulnerability generally refers to the likelihood of injury, death, loss, disruption of livelihood or other harm, manifested in the form of risks, as a result of environmental shocks or harm resulting from social changes (O’Brien, Eriksen, Nygaard & Schjolden, 2007).

The term ‘vulnerability’ is used in many different ways by researchers (Füssel, 2007, 2009; Füssel & Klein, 2006). Janssen, Schoon, Ke and Borner (2006) found 939 references to scientific articles that used ‘vulnerability’ as a keyword in global environmental change research alone. Vulnerability has also been related or equated to concepts such as resilience, marginality, susceptibility, adaptability, fragility, and risks (Füssel, 2009) adding ‘exposure, sensitivity, coping capacity, and criticality’ to the list (Füssel & Klein, 2006). There are important scale dimensions, of both time and space, to vulnerability contexts as well as adaptation (Handmer et al., 1999). As Brouwer et al. (2007) expressed, the variation in social and economic vulnerability to environmental risk can be explained locally at the individual household or community. Therefore vulnerability is a relative and social construct and includes a subjective evaluation of the desirability and importance of the magnitude and distribution of projected effects (Füssel & Klein, 2006).

2.5.2 Conceptual Approach

Several conceptual frameworks categorize vulnerability factors and describe different vulnerability concepts (Füssel, 2009). The scientific use of vulnerability has its roots in geography and natural hazards research but is now becoming a central concept in a variety of other research contexts such as ecology, secure livelihoods and famine, sustainability science, climate change and adaptation (Füssel, 2007). As a result, the conceptualization of the term is very diverse across different disciplines (Nielsen, 2008), with the term ‘vulnerability’ being used in different policy contexts (Füssel, 2007) and approach adopted. Füssel (2007), classified vulnerability factors into two dimensions: sphere (distinguishing internal from
external factors) and knowledge domain (distinguishing socio-economic from biophysical factors) (see Figure 2.6). Conceptualization of vulnerability into different schools is the product of the combination of, or exclusion of these dimensions.

<table>
<thead>
<tr>
<th>Sphere</th>
<th>Socioeconomic</th>
<th>Biophysical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal</td>
<td>Household income,</td>
<td>Topography,</td>
</tr>
<tr>
<td></td>
<td>social networks,</td>
<td>environmental conditions,</td>
</tr>
<tr>
<td></td>
<td>access to information</td>
<td>land cover</td>
</tr>
<tr>
<td>External</td>
<td>National policies,</td>
<td>Severe storms,</td>
</tr>
<tr>
<td></td>
<td>international aid,</td>
<td>earthquakes,</td>
</tr>
<tr>
<td></td>
<td>economic globalization</td>
<td>sea-level change</td>
</tr>
</tbody>
</table>

(Source: Füssel, 2007, p. 158)

**Figure 2.6: Examples for each of the four categories of vulnerability factors classified according to the dimensions sphere and knowledge domain**

Therefore, vulnerability due to risk hazard is determined by the potential exposure of the biophysical system to hazards (Füssel, 2007; Füssel & Klein, 2006). In this approach, two factors such as the ‘hazards’ (which are potentially damaging events, phenomena or human activity) that are characterized by their location, intensity, frequency and probability, and the ‘vulnerability’ (the relationship between the severity of hazards and the degree of damage caused), determines the threat to a particular system (Füssel, 2007).

As per Stonich (n.d.), the human ecology approaches to vulnerability places human–environment interactions within a broader political and social context. As highlighted by ACIA (2005), vulnerability of the coupled human–environment system manifests differently across age, culture and economic sectors and therefore indicates the varied perspectives on what constitutes a vulnerable condition. This highlights the need to appraise the exposure, sensitivity, and adaptive capacity of a coupled human-environment system to take into account the knowledge, observation and participation of people who are part of the system.

Many scientists also emphasize the importance of socio-economic factors (often denoted as adaptive or coping capacity) for the differential vulnerability of regions and population groups, which is a central feature of the political-economy approach (Füssel, 2009). Vulnerability from this standpoint exclusively refers to people, and is based on socio-
economic vulnerability to multiple stresses (Füssel, 2007). As far as the political dimension is concerned, societies in transition are most vulnerable to crises and conflict, which could weaken or destabilise their governance system (WBGU, 2008). Institutions responsible for and capable of responding to vulnerability are the locus of vulnerability governance (Ribot, 2009 [forthcoming]). This implies that, within a social setting, governance plays a significant role (Hussain, 2008), in escalating or reducing vulnerability. Vulnerabilities generated by socio-economic, political and environmental conditions in combination with certain inherent features and characteristics of a system or group in question, make some countries/social groups/communities weak and prone to, or strong in resisting and withstanding, threats and/or disasters (Hussain, 2008).

The integrated approach to vulnerability looks at both the internal and external dimensions of vulnerability (Füssel, 2007; Füssel & Klein, 2006) to environmental hazards; with external dimensions representing the ‘exposure’ factor and internal the ‘sensitivity’ and ‘adaptive capacity’. The integrated vulnerability approach is widely used in global environmental change and climate change with reference to regions, communities or other social units (Füssel, 2007).

The most prominent interpretations of vulnerability in the climate change context are contextual vulnerability and outcome vulnerability. These interpretations of vulnerability are based on different conceptual frameworks, and suggest different strategies for reducing vulnerability (Füssel, 2009). Contextual vulnerability is rooted in political economy, which is determined by the internal characteristics of a system or community (Füssel, 2009), and focuses the analysis on who is most vulnerable and why (Füssel, 2007). Vulnerability to environmental change does not exist in isolation from the wider political economy of resource use, inadvertent or deliberate human action that reinforces self-interest and the distribution of power (Adger, 2006), conflict or crisis of various natures also influence vulnerability. Therefore, Makako & Kaplan (2005) suggested that vulnerability hinges on the notion that certain groups in society are more susceptible to stressors that threaten livelihood and survival. These groups are important in the analysis of vulnerability because of their inability to take advantage of profitable opportunities (Makako & Kaplan, 2005), or cope to the

---

2 The term ‘governance’ has many different meanings depending on the context in which it is used (Rhodes, 1997, cited in Hussain, 2008). It is about the political-administrative, economic and social organization of authority, its powers and accountabilities (Ribot, 2009 [forthcoming]).
impacts of stressors and are at high risk of perpetuating poverty. This interpretation addresses primarily the needs of an adaptation policy and of broader social development (Füssel, 2007). Outcome vulnerability is rooted in the integrated vulnerability concept (Füssel, 2009). Therefore, vulnerability is a complex term, and is used differently depending on the disciplinary context.

Despite the many different approaches, all authors agree that vulnerability is a multidimensional concept that comprises physical, social, economic, environmental, political, cultural and institutional factors (Makako & Kaplan, 2005). However, in the field of climate change, vulnerability is most often described in terms of three primary attributes, the exposure, sensitivity and capacity (Hallie, 2008) of a human group or ecosystem.

2.6 Public Understanding of Climate Change

The consequences of climate change for tourism manifest as risks and it is therefore important to recognize their implications in order to reduce the vulnerability contexts and to assist stakeholders to prioritize the unacceptable risks and take necessary action. But, as previously discussed, vulnerability is a complex multidimensional concept with its capacity to impact the system and the people in diverse ways. Therefore, an understanding of the perceptions and positions of the system and its people is an important component of policy formulation and taking effective action for sustainable tourism management in the context of climate change.

There is much literature concerning public perception of climate change, demonstrating a wide general awareness of the issue (Bickerstaff, 2004; Hertin, Berkhout, Gann, & Barlow, 2003; Lorenzoni, Cole & Whitemarsh, 2007; Shackley & Deanwood, 2002; Vedwan, 2006). Of these, risk perception is an emerging research interest mainly in public understanding of climate change and adaptation. However, perceiving climate events (whether due to variability or climate change) as a risk is a complex phenomenon itself. For many of the population, the projected changes in average climate conditions outlined above are of themselves somewhat irrelevant and meaningless (Amelung, Nicholls & Viner, 2007). Rather, societal interest in climate change tends to centre on its potential to affect current ways of life, living conditions and livelihood.
During the past quarter-century, researchers have intensively studied risk from many perspectives (Slovic, 2002). Risk perception is a multidisciplinary research field (Bickerstaff, 2004) and therefore a wide variety of disciplinary interests are represented in the study of risk, including sociologists, psychologists, economists, geographers, safety engineers, and philosophers (Espiner, 2001). Risk perception is the process through which individuals form impressions about threats to the things they value and is influenced by experience, personality traits, and social norms and, therefore, connotes subjectivity (Espiner, 2001). This is because perception of and response to risk and hazard are formed in the context of a range of social, cultural and political factors, therefore it can be said that risk perceptions are grounded in the social and cultural experiences of everyday life (Bickerstaff, 2004).

The risk perception study has been reviewed from three approaches: the axiomatic measurement paradigm, the socio-cultural paradigm and the psychometric paradigm. According to Slovic (2002, p. 6), the axiomatic measurement paradigm focuses on the way in which people subjectively transform objective risk information. The socio-cultural paradigm examines the effect of group- and culture-level variables on risk perception, whereas the psychometric paradigm identifies people’s emotional reactions to risky situations that affect judgments of the riskiness of physical, environmental, and material risks in ways that go beyond their objective consequences. The socio-cultural approaches to risk perception emerging from disciplines such as geography, sociology and anthropology, have placed understanding of climate change within a wider social, cultural and political frame (Bickerstaff, 2004). This approach identified key dimensions such as place and location, agency and power, communication (Bickerstaff, 2004) and values and beliefs (Vedwan, 2006) as influences upon risk perception.

### 2.6.1 Place and Location

Many public perception studies undertaken in particular locations stress the role of life experiences (Bickerstaff, 2004), and certain common sense perceptions that are deeply embedded in people’s interpretation of the physical world around them, derived and reinforced by their daily sensory observations of the physical environment around them (Gilmore, 2000). Local memory is also an important factor (Whyte, 1985) in how people make sense of climatic events. With memory an individual’s perception of climatic events is affected by the varying characteristics of climate (e.g., seasonal variability, annual variability, extreme events), the size, nature and distribution of impacts and time perspectives (Whyte,
As shown in Figure 2.7, people perceive or have a better memory of short-term climatic events such as floods or landslides than longer term trends such as global warming or climate change. Thus, individuals are prone to attach greater importance to events that are likely to occur and about which there is some experience, or at least agreement, about what will happen (Whyte, 1985).

![Figure 2.7: Climate Variability and Direct Experiential Perception](source)

In addition, people living within particular geographic locations perceive and cope with changes or uncertainty in their environment, in a strikingly similar fashion. According to Vedwan (2006), in the societies of mountain areas, perception of risk and vulnerability combine aspects of local knowledge, which is intergenerational (due to the broader historical relationship with the environment), linked with crop-climate linkages, as well as the identity of mountain people. This has been noted for similar natural resource dependent rural communities (Vedwan, 2006), in many mountain areas of the world. Similarly, another important characteristic of mountain communities is the existence of similar livelihood and risk minimization or pooling strategies (Agrawal, 2008; Vedwan, 2006).

### 2.6.2 Agency and Power

Risk perception relates to subjective perception and the point at which an individual or a group perceives risk is as much influenced by socially defined roles, characteristics and values of the decision-makers (individual or collective), as it is by their exposure to the probability of an event, impacts and consequences, and the choice of adjustment. In terms of socially defined roles, the demographic characteristics, gender roles, race differences, and power differences (Bickerstaff, 2004), have been identified as predictors of risk perception. Less recognized, but equally important for perception studies, is that each individual plays
several roles and this multiplicity of roles affects the ways (Whyte, 1985) in which risk is perceived.

The power of individuals to influence conditions that affect them is closely tied up with perception of risk (Bickerstaff, 1999, as cited in Bickerstaff, 2004). A study by Gilmore (2000) showed that a common response from an audience presented with the impacts and threats surrounding global warming, is inaction due to being overwhelmed. Bickerstaff (2004) found people felt powerless to influence a problem as large and ubiquitous as air pollution. Research has also shown that when risk moves away from everyday life, dangers become more distant in space and time and personal action is seen to be increasingly futile (Bulkeley, 2000). Like so many forms of environmental degradation, the pace of climate change is gradual and fragmented so people become acclimated to the changes without being alarmed by them (Gilmore, 2000).

2.6.3 Communication

In recent decades, research on global warming and the possible impacts of climate change have resulted in series of publications to facilitate public understanding of climate change impacts and adaptation; mass media (radio, television, newspapers) have become the principal source of information, disseminating volumes of knowledge and information on climate change. However, scientists, policy makers, and journalists have experienced the challenges and complexities (Weinhart et al., 2000) in communicating this story successfully to the general public and enhance understanding about this issue. In addition to the impact of certain common sense perceptions; Bickerstaff (2004) also stated that the information provided had little relationship to most people’s daily issues or cultural understanding and therefore is dismissed as irrelevant. Irwin et al., (1999) therefore argued for a more contextual approach to risk management and communication that is sensitive to the process through which people make sense of their immediate environment.

2.6.4 Values and Belief

There is an increasing recognition of tourism spaces as socio-cultural constructions rather than physical locations (Pritchard & Morgan, 2001). Therefore, tourism destinations in remote mountain regions, besides being physically attractive, are also important cultural landscapes
socially constructed by people residing there. And as Vedwan (2006) stated, perception of risk therefore ought to be treated as a subset of a broader, more enduring set of beliefs and attitudes for their importance in shaping as well as selecting particular forms of risk for attention. Perception of risk also plays a role in risk analysis (Slovic, 2002) and therefore highlights the issues of values, process, power, and trust that shape such perception.

Values and beliefs are important determinants because they predispose attitude and ultimately the behaviour of individuals. These values and beliefs about climate change are determined by cultural contexts. This has been analysed from the point of view of Cultural Theory and, as Seacrest, Kuzelka and Leonard (2000) stated, the theory holds that societies’ and individuals’ world views fall within one of four typologies: fatalism, hierarchy, individualism and egalitarianism. People’s perceptions of risk are important in predicting behavioural intentions to take action on climate change (O’Connor, Bord & Fisher, 1999), which is largely influenced by cultural determinants, as well as by the notion of public fatalism. For example, individuals are more likely to support costly climate change initiatives if they experience climate change effects or perceive climate change as likely and threatening to their immediate well-being (Zahran et al. 2006).

Moreover, as Irwin et al., (2003) suggested, the assumption that greater public knowledge of scientific and technological developments will lead to greater public acceptance has been a conventional approach, and thus highlights the need towards understanding the science and the public. Integration of science and the public as suggested by Irwin et al. (2003) requires investigating the understanding between facts and values. Social science research suggests that ‘values are […] linked to the contexts of their generation’ (Irwin et al, 2003), so the public may not simply embody values about the world but may also have valuable knowledge of its own to offer. The public understanding of science is therefore an outcome of valuable knowledge or the differences in the underlying epistemological and ontological premises. This is because the human dimension of risk perception, or climate change, is intricately linked to public values and beliefs. Risk perceptions are therefore part of broader human-environment relationships.
2.7 Chapter Summary

Chapter 2 reviewed the literature on vulnerability assessment of NBT to climate change. The chapter examined NBT, its supply system and climate change in the context of Nepal. The section also explored the concepts underpinning vulnerability and public understanding of climate change.

Research on vulnerability assessment of NBT to climate change and public perception in Nepal is very limited. There are, however, a number of broad conclusions that can be drawn, supported by the wider literature (Espiner, 2001) from similar research conducted elsewhere. First, the NBT supply system is a composite and dynamic concept and the interplay of social, economic and political factors shapes the NBT supply production system because of the value attachment in terms of environmental, economic and cultural, and aesthetic values. Second, there is no consensus definition for vulnerability; it has been used in many different ways. Vulnerability is a complex, dynamic and multi-dimensional concept that comprises physical, social, economic, environmental, political, cultural and institutional factors (Makako & Kaplan, 2005), and is a function of exposure, sensitivity and resilience of a human group or ecosystem.

Third, the conceptual frameworks for assessing vulnerability are multidisciplinary. Reviewed literature showed that conceptualization of vulnerability into different schools is the product of a combination of, or exclusion of, different dimensions such as spheres and domain; there is no one single universal framework. This highlights the fact that the vulnerability assessment framework for climate change should be an applied concept based on the contexts and the dimensions of the factors involved and the scope of the research.

Fourth, similar to vulnerability, public understanding of and response to climate change is influenced by range of factors that are context specific. The literature showed that public perception is tied closely to visual, historical relationships with the environment, experiential knowledge tied closely to livelihood practice, and cognitive memory. Risk perception is also influenced by socio-economic factors and political conditions and therefore shows that public understanding of climate change is driven by factors such as socially defined roles, power and knowledge. Similarly, public understanding of climate change is a value-laden construct and comes with predisposed socio-cultural and political assumptions, values and beliefs. The central argument that can be drawn from this chapter is that the stakeholders’ perceptions of
vulnerability of NBT to climate change impacts need to consider the complexity, dynamic and varied nature of contextual dimensions and equally varied perceptions of the public in their understanding of climate change.

The literature on NBT supply systems provides an important foundation that helps to elicit a detailed account of the supply system of lower Mustang in Chapter 3. The literature on vulnerability provides the conceptual basis to formulate the vulnerability assessment framework for this study, which is discussed in Chapter 4. The literature on public understanding of climate change provides a fundamental basis to inform my understanding while analyzing stakeholders’ perceptions of and response to vulnerability contexts, especially climate change discussed in Chapters 5 and 6.

The reviewed literature indicates an important gap (Espiner, 2001). First, there is a lack of empirical studies on the vulnerability and tourism stakeholders’ perceptions related to climate change in Nepal, let alone ACA or lower Mustang. Virtually nothing is known about how these grassroots stakeholders understand climate change, what awareness level and issues related to such change exist, and how they are responding to it. This study therefore attempts to fill this gap by examining current knowledge of the vulnerability contexts in the NBT supply system of lower Mustang from the stakeholders’ perspectives.
Chapter 3
Lower Mustang: The Northern Frontiers of Annapurna Conservation Area

3.1 Introduction

The purpose of this chapter is to describe the study area – the lower Mustang of the Mustang district. This contextualises the research. Lower Mustang is characterised by contrasts but for the purpose of the study, the information is restricted to the geo-morphology and social economy of the study area. It gives a broad overview of tourism with a detailed account of the NBT supply system, governance context and stakeholders’ characteristics.

3.2 Geographical Location

Mustang lies in the north-western frontiers of the Annapurna Conservation Area, Nepal’s largest protected area (PA). It is bordered by Dolpo district in the west of the Karnali zone, Manang district in the east of the Gandaki zone, the Tibetan Autonomous Region of People’s Republic of China in the north and Myagdi district of the Dhaulagiri zone in the south. Geographically, Mustang is divided into Upper and Lower Mustang. The district covers 3573 sq. km with the elevation ranging from 2000 m to 8167 m above sea level (NTNC, 2008) (see Figure 3.1). Lower Mustang is the southern part of Mustang in the Dhaulagiri Zone, north western Nepal, stretching from Lete VDC in the south to Jhong VDC in the north. The area can be divided into semi arid plateaus and valleys of the north (Jhong to Tukuche VDCs) and densely forested valleys of the south (Kobang to Lete VDCs).
3.3 Geomorphology of the Area

Lower Mustang, covering 1000.9 sq. km, is a diverse landscape. The land use map (see Figure 3.2) shows that the majority of the area is either grazing land or barren. The map indicates the marginality of agricultural land, which is pronounced throughout the region, and so is the availability of forest land, especially in the north. The Kali Gandaki River, originating in northern most Mustang, on the border between the Himalayas and the Tibetan Plateau, is the most important feature sustaining life. This river is an important factor in the ecology of lower Mustang (Kvaloy & Sandvik, 1992). Because of its semi arid condition, water is extremely limited in Mustang. Water bodies represent only 2 percent of the total land cover.
3.4 Socioeconomic Conditions of lower Mustang

Gender equality is strongly pronounced within Mustang society. As shown in Table 3.1 the district is first in the ratio of adult gender imbalance in non-agricultural occupations, gender empowerment index and second in the gender discrimination index. As stated by NTNC (2008), 55.5 percent households of Mustang belong to the ‘ultra poor’ and 19.8 percent to the ‘poor’ category, indicating pronounced poverty in Mustang. The poverty index for this area exceeds the national average of 33 percent (see Table 3.1). With the average income of Rs 6952 (NTNC, 2008), the majority of the people in Mustang are poor. The hierarchical structure and class rules, although not as strictly followed as previously determined, status differences between different castes, regulated on the principles of ritual purity and impurity (Kvaloy & Sandvik, 1992) still exist. Dahal (1999) stated that the increasing unevenness in public access to social entitlements, power, wealth, knowledge and basic human rights has effectively locked the poor and powerless inside a permanent underclass cage.
Table 3.1: Socio-economic parameters of Mustang

<table>
<thead>
<tr>
<th>Socio-economic Parameters</th>
<th>Mustang District</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area (sq.km.)</td>
<td>3,562.04</td>
</tr>
<tr>
<td></td>
<td>Lower Mustang: 1000.9</td>
</tr>
<tr>
<td>Population</td>
<td>13851 (M=7137, F=6714)</td>
</tr>
<tr>
<td></td>
<td>Lower Mustang: 7591 (M=4026, F=3565)</td>
</tr>
<tr>
<td>Number of Households</td>
<td>2576</td>
</tr>
<tr>
<td></td>
<td>Lower Mustang: 1511</td>
</tr>
<tr>
<td>Average Household Size</td>
<td>5.4</td>
</tr>
<tr>
<td>Population Density/sq.km.</td>
<td>4</td>
</tr>
<tr>
<td>Households having either ‘agriculture land’ and/or</td>
<td>2,498</td>
</tr>
<tr>
<td>‘livestock’ and/or ‘poultry’</td>
<td>(97%)</td>
</tr>
<tr>
<td>Households engaged in Non-agricultural occupation</td>
<td>Total – 955</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>43 (1.6%)</td>
</tr>
<tr>
<td>Trade/Business</td>
<td>82 (3.1%)</td>
</tr>
<tr>
<td>Tourism (lodges and campsites)</td>
<td>170 (6.5%)</td>
</tr>
<tr>
<td>Transport</td>
<td>56 (2.1%)</td>
</tr>
<tr>
<td>Services</td>
<td>527 (20.4.3%)</td>
</tr>
<tr>
<td>Others</td>
<td>77 (3%)</td>
</tr>
<tr>
<td>Household having access to Drinking Water</td>
<td>2465 (86.96%)</td>
</tr>
<tr>
<td>Overall Literacy Rate</td>
<td>52.08 (37)</td>
</tr>
<tr>
<td>Adult Literacy Rate (female)</td>
<td>41.6</td>
</tr>
<tr>
<td>Adult Literacy Rate (male)</td>
<td>61.4</td>
</tr>
<tr>
<td>Adult Gender Imbalance Ratio in Non-agricultural</td>
<td>0.49 (1)</td>
</tr>
<tr>
<td>Occupation</td>
<td>Gender Empowerment Index</td>
</tr>
<tr>
<td></td>
<td>Gender Discrimination Index</td>
</tr>
<tr>
<td></td>
<td>Human Poverty Index</td>
</tr>
<tr>
<td></td>
<td>Drinking Water Coverage</td>
</tr>
</tbody>
</table>

Note: The numbers within parentheses represent the rank of Mustang compared with the 75 other districts of Nepal. Rank 1 represents the best condition. (Source: DDC-Mustang, 2001, KMTNC-ACAP, 2005 and NTNC, 2008).

3.4.1 Demography and Ethnicity

The 2001 population census estimated a total population of 7591 in lower Mustang and 1511 households (DDC-Mustang, 2001). Ethnically lower Mustang is divided into three prominent geographic areas such as: Thak Satsae (lit: seven hundred houses), Panch Gaun (lit: five villages) and Bara Gaun (lit: twelve villages) (see Figure 3.3). The population composition of Thak Satsae and Panch Gaun is predominantly Thakalis whereas in Bara Gaun there is a
mixed composition of Gurung, Bista and Thakali. People from other ethnic divisions such as Magar and those ‘labelled’ as occupational castes, also mainly inhabit in this area.

Buddhists comprise 90.8 percent of the households of Mustang, and 9 percent follow the Hindu religion (DDC-Mustang, 2001). However, a great deal of overlap exists between Buddhism and Hinduism, particularly in the lower Mustang region. Thak Satsae, located here, is a meeting point of the high Himalayan Tibetan Buddhism and the Hinduism of the hills and plains. The oldest religion of Mustang is known as Bon-Po. Bon was here before Buddhism arrived. The Thak Khola valley culture/religion was predominantly influenced by a mix of Bon and Tibetan Buddhism. In Bon, natural phenomena and nature are worshipped, as is evident from the four deities of the Thakali clans, which are birds.

People of lower Mustang have unique traditional social systems, landscapes and beliefs. This uniqueness is reflected in their way of life and through their village settlement pattern. The settlements are usually located on the valley floor and consist of dense clusters of houses, separated by narrow alleys. Houses and inns are built in traditional architectural styles, with flat mud roofs and mud walls, and stacks of firewood, which line the rooftop, are used mainly for cooking and heating. Although hotels and houses use gas and electricity for most cooking and heating purposes, firewood is most popular in winter. The traditional socio-cultural system, such as the Mukhiya system, and the social divisions of people based on castes, are still part of the traditional way of life in lower Mustang.
3.4.2 Livelihood Options and Strategies

Lower Mustang, like most mountain regions, is characterized by a resource base and production environment referred to as ‘mountain specificities’. Of particular importance are inaccessibility, fragility, marginality, diversity, niche and human adaptation mechanisms (Jodha, 1992). These features dictate the way livelihood options and strategies are practised in lower Mustang.

Historically, the southern belts of lower Mustang from Tukuche to Ghasa were major trade centres along the salt trade routes that linked Tibet with the southern regions of Nepal. In general, agriculture including livestock husbandry is the mainstay of the local economy of most people residing in Mustang district. Almost 77 percent of the people of this district are involved in agriculture (NTNC, 2008). Villages between Puthang and Tukuche are irrigated and account for 63 percent of the total agriculture land. Buckwheat, barley and potato used to be the subsistence crops (Kvaloy & Sandvik, 1992), but have now expanded into maize and a variety of vegetables. The densely forested southern area, especially the villages of Lete and Kunjo VDCs, is the warehouse of the Mustang district.

About 18 percent of Mustang households have food from their own production for three months and 38.6 percent for a maximum of 6 months (NTNC, 2008). As low rainfall and high altitude allow only a single crop per year, the people previously also raised livestock and traded products such as salt and wool. Winter was harsh and since no modern farming knowledge existed, fields were left fallow and many would migrate for trade and labour to southern Nepal and North India. This is an important risk strategy to compensate for the non productive winter months and supplement the household income.

Although Thakalis and Gurungs are primarily subsistence farmers, the popularity of tourism in the late 1970s has led many to opt for tourism businesses, mainly operating guest houses and trading goods for tourism use. Since then, tourism has become an important alternative source of income for most people residing in Muktinath, Kagbeni, Jharkot, Jomsom, Marpha, Tukuche, Kobang, Lete and Ghasa. In addition, the establishment of the horticultural research centre in 1966 introduced intense agriculture practices that resulted in the cultivation of fruits (apples, pear, apricots, etc.) and vegetables. Tourism and intense agriculture have become the dominant livelihood options for most stakeholders of this area, supplemented by other options.
3.4.3 Social Networks

There are different types of traditional as well as social networks/institutions in the area. Of these, the Mukhiya system is a strong traditional institution active in the administration and management of village affairs within respective VDCs. Traditionally, local decision-making and the administration of justice, rules and regulations was through a centralized local political institution under the leadership of Mukhiya, the village headman. Major decisions were made at a village council meeting called by the Mukhiya, regarding the resource (forest, water, public land, etc.) utilization rights, maintenance and protection of culture and tradition, village social issues such as migration of people (both in and out), business taxation, mobilization of labourers, farming and settlement of disputes. The system also played a significant role in mitigating the impacts of natural disasters such as floods, landslides and fires through community mobilization providing immediate relief and support.

At a broader village level, the non-formal traditional financial network such as ‘Dhikuri’ represents an innovative local initiative to provide support to those who need help in a financial crisis. In this system a number of shareholders put money into a common fund, where the person who took the initiative and is in immediate need of money, is the first to receive funds (Kvaloy & Sandvik, 1992). The system’s success lies in people not having to put up collateral like seeking a loan from bank or from moneylenders, who usually take high interest and put the borrower in a dependent situation. As many Thakalis are traders, this means of getting immediate capital may have also made the system very popular.

3.5 Nature Based Tourism Supply in Lower Mustang

Nature based tourism (NBT) is an important component of the Annapurna Conservation Area (ACA), Nepal’s largest protected area (PA) and a premier destination. Within ACA, lower Mustang is an important destination area for NBT. Trekkers annually pay US$ 1.1 million as a fee (combined fee for upper and lower Mustang) (NTNC, 2008), the major source of revenue for conservation and development activities in this area. ACAP’s annual investment in conservation and development is financed through sharing revenue from the entry fee levied on tourists and from the support of international donors (Bajracharya, Furley & Newton, 2006). In addition, tourism has also provided indirect benefits to the farmers because of the high demand for locally grown fresh agricultural produce such as fruit (apple, pears, apricots), vegetables, cereals, and distillery products (apple brandy, juice, cider).
The NBT of lower Mustang largely depends on natural and cultural resources such as mountain scenery, landscape, climate, biodiversity, indigenous culture and lifestyles. Drawing on these resources, niche NBT activities such as trekking, mountaineering, religious tourism and, to some degree, bird watching are carried out in lower Mustang. This diversity coupled with the interaction between natural and human systems produces a distinct NBT here.

3.5.1 Natural Assets

3.5.1.1 Physical Resources

The landscape of lower Mustang is very dynamic. Today’s landforms are the result of land-forming processes that have been occurring for millions of years (Kvaloy & Sandvik, 1992). The dry and treeless area between Marpha and Jomsom was a lake during the last glaciation of the Himalayas (Kvaloy & Sandvik, 1992). In addition, the Kali Gandaki River system and tectonic movement have influenced the landforms known today as lower Mustang. The Himalayan mountain system, which is still rising, is the longest, highest, steepest and youngest in the world (Pandey, 1999). The ongoing uplifting process has further enhanced the eroding capacity of a river like Kali Gandaki, which in turn has eroded its own sediments deposited earlier. This indicates that the landform is unstable all over lower Mustang especially where there are sparse trees (Kvaloy & Sandvik, 1992). Mountains such as Annapurna 1 (8081m), Dhaulagiri (8167 m), Nilgiri (7060m) and Tukuche Peak form the key landscapes that have been the drawcards for most who love mountaineering or simply admiring the magnificent views.

The Kali Gandaki is the major river system of the district with 20 tributaries (NTNC, 2008). These tributaries are complex and include Ghami khola, Tsarang khola, Chiprung khola, Ghechang khola, Tange khola, Narsing khola, Sangta khola, Panda khola and Boksi khola. All these tributaries originate from glaciers lakes, ponds and reservoirs (KMTNC-ACAP, 2006). Besides this river system, the area has limited water bodies but includes lakes such as Titi lake, Dhumba lake and Sekong lake. These high altitude lakes are important resting and breeding grounds for many birds visiting Nepal.

Lower Mustang’s climate is geographically varied. The north, being located in the trans-Himalayan zone, has a distinct climate such as lower precipitation, strong winds and rapid evaporation giving it a desert like environment. In the south, the high Himalayan range is not
a barrier hence it has excessive rain and mild winds, making it the greenest part of lower Mustang (see Figure 3.4). This precipitation gradient has a significant bearing on the ecological and cultural dimension of the area. The annual maximum temperature occurs in June and starts to decrease from October reaching an annual minimum in December or January (Regmi & Adhikari, 2007).

(Source: NTNC-ACAP, 2007)

**Figure 3.4: Rainfall map of lower Mustang**

The distinct climate variability is an important determinant in the production of NBT supply systems, especially the natural and human systems in lower Mustang. The snow-capped mountains, the landscape and the types of flora and fauna are the typical assets of the natural systems. The traditional village set-up and agricultural patterns are the most important assets of the human system.

### 3.5.1.2 Biological Resources

The unique position of lower Mustang makes it an important habitat for floral and faunal diversity. The area is the transitional zone between two biomes; the northern area representing the southern fringe of the semi desert Tibetan plateau, and the southern area, representing the northern fringe of the moist and forested Indian sub continent (Kvaloy & Sandvik, 1992).
Forest covers 3.24 percent of Mustang’s total landmass, consisting of mixed broad leaved forest such as *Acer* species, rhododendron and, at higher elevations, conifers with birch *Betula utilis* (NTNC, 2008). Rhododendron, the national flower of Nepal, is found in Lete VDC. Although Ghorepani is famous for having one of Nepal’s largest rhododendron forests, these beautiful flowers are also found in the forests of Lete. The best time to view the blooms is March/April. In addition, the area is very rich in medicinal and aromatic plants with very high economic and ethno-medicinal values (NTNC, 2008). Over 200 species of non timber forest products (NTFPs) (e.g. ‘Yarsagumba’ (*Cordyceps sinensis*³)) have been identified in Mustang (NTNC, 2008).

Over a short distance of 42 km (between Ghasa to Muktinath), the altitude of the area ranges from 2010 m to 3800 m, resulting in a diverse fauna. The Ghasa area is an important hotspot for birds and is the only area in Nepal where all six Himalayan pheasant species (cheer pheasant, *Catreus wallichi*, satyr tragopan, *Tragopan satyra*, blood pheasant, *Ithaginis cruentus*, koklass pheasant, *Pucrasia macrolopha*, Himalayan monal, *Lophophorus impejanus* and kalij pheasant, *Lophura leucomelanos*) are found (NTNC, 2008). The area is also the major corridor for many trans-Himalayan migratory birds such as demoiselle crane, *Anthropoides virgo* (NTNC, 2008).


### 3.5.2 Human Assets

#### 3.5.2.1 Socio-Cultural Resources

Culturally, lower Mustang is an important area consisting of people of different ethnic origin and rich religious and cultural heritage. Centuries-old monasteries, temples and traditional villages make lower Mustang unique and mysterious. The people of this region to a large extent have preserved their traditional culture and heritage, the language, rituals and practices.

³ Known as ‘Yarsagumba’ in Nepali and caterpillar fungus in English, *Cordyceps sinensis* is a high value medicinal mushroom in oriental medicines. Found in high Himalayan regions of Nepal, the fungus is a most sought after item due to its high market value.
3.5.2.2 Socio-Economic Resources

The economy of this region as discussed in section 3.4.2 is based on farming and tourism; alongside some supplementary livelihood activities such as trade and business.

3.5.3 Tourism Assets

3.5.3.1 Accommodations

There are 138 lodges/hotels in lower Mustang with a bed capacity of 2845 (see Table 3.2). This means that 138 households out of a total 1511, i.e., 9 percent of households, are directly involved in the provision of accommodation service. A five star hotel has been operating in Puthang since 2000 (NTNC, 2008).

Table 3.2: The number of accommodation services in lower Mustang

<table>
<thead>
<tr>
<th>VDC</th>
<th>Villages</th>
<th>No. of Hotels</th>
<th>Bed Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jhong</td>
<td>Jhong</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Muktinath</td>
<td>Muktinath</td>
<td>14</td>
<td>316</td>
</tr>
<tr>
<td></td>
<td>Jharkot</td>
<td>6</td>
<td>81</td>
</tr>
<tr>
<td></td>
<td>Khinga</td>
<td>4</td>
<td>38</td>
</tr>
<tr>
<td>Kagbeni</td>
<td>Kagbeni</td>
<td>17</td>
<td>353</td>
</tr>
<tr>
<td></td>
<td>Eklebhatti</td>
<td>5</td>
<td>77</td>
</tr>
<tr>
<td>Jomsom</td>
<td>Jomsom</td>
<td>2</td>
<td>62</td>
</tr>
<tr>
<td>Marpha</td>
<td>Puthang</td>
<td>24</td>
<td>619</td>
</tr>
<tr>
<td></td>
<td>Syang</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Marpha</td>
<td>15</td>
<td>284</td>
</tr>
<tr>
<td>Tukuche</td>
<td>Tukuche</td>
<td>11</td>
<td>232</td>
</tr>
<tr>
<td>Kobang</td>
<td>Khanti</td>
<td>2</td>
<td>53</td>
</tr>
<tr>
<td></td>
<td>Naurikot</td>
<td>1</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>Larjung</td>
<td>4</td>
<td>96</td>
</tr>
<tr>
<td>Lete</td>
<td>Kokhethanti</td>
<td>4</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td>Dhampu</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Kalopani/Lete</td>
<td>16</td>
<td>316</td>
</tr>
<tr>
<td></td>
<td>Missi</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Ghaiku</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Ghansa</td>
<td>6</td>
<td>158</td>
</tr>
<tr>
<td>Kunjo</td>
<td>Paiothapla</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>138</td>
<td>2845</td>
</tr>
</tbody>
</table>

(Source: NTNC-ACAP, Jomsom)
3.5.3.2 Road Access

Following the Nepal government’s 10th Five-Year Plan, the Beni – Jomsom Road has been constructed and came into operation in 2007. The key strategy of this road project was to reduce poverty and achieve government targets. This 90 km long feeder road is to be developed into a major national highway, the Kali Gandaki Highway, running along the Kali Gandaki River. It is aimed at capturing the benefits from the enormous Indo-China trade potential. As per this plan, the second phase of construction from Jomsom to Korolla (the Nepal-China border) is underway (see Figure 3.5). Once the Jomsom-Korolla road construction work is complete, Mustang will be one of the few mountain districts in Nepal that can be reached within a day’s drive from Kathmandu (NTNC, 2008). The government of China is constructing the road that links its high mountain pass with the Jomsom – Korolla road of Mustang. A sum of $20 million is reported to have been spent by the Chinese government in the first phase of road construction (Jolly, 2010), linking Nepal to Tibet and then China.

Figure 3.5: A map showing the planned Kali Gandaki Highway in Mustang
3.5.3.3 Activities

Lower Mustang, the northwestern part of ACA, is popular for trekking, mountaineering and religious tourism. The area, in the strategic location on the western half of the world famous ACT, attracts an average of 18583 tourists per year (see Table 3.3). Tourists from distant destinations such as the Europe and America comprise the majority of tourists visiting lower Mustang. The popularity of ACT and Mustang is largely through ‘word of mouth’. Some 70 percent of the tourists learned about the ACT and ACA from family, friends and fellow travellers (Poel Van der, 2006). The study also shows that mountains, landscape, trekking/physical activity, people and village set-up and biodiversity have been the main reasons for most tourists visiting the lower Mustang side of ACT. Besides ACT, treks such as the Jomsom-Muktinath Trek and Upper Mustang Trek are also popular. In addition to this, the southern part of lower Mustang, especially Ghasa area is popular for bird watching.

Table 3.3: Monthly tourist arrivals in Mustang

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>816</td>
<td>690</td>
<td>427</td>
<td>352</td>
<td>477</td>
<td>502</td>
<td>486</td>
<td>507</td>
<td>412</td>
</tr>
<tr>
<td>February</td>
<td>1,471</td>
<td>1,640</td>
<td>590</td>
<td>474</td>
<td>682</td>
<td>626</td>
<td>460</td>
<td>409</td>
<td>531</td>
</tr>
<tr>
<td>March</td>
<td>2,392</td>
<td>2,954</td>
<td>1,864</td>
<td>1,610</td>
<td>2,129</td>
<td>1,808</td>
<td>1,424</td>
<td>1,905</td>
<td>2,369</td>
</tr>
<tr>
<td>April</td>
<td>2,374</td>
<td>2,917</td>
<td>2,319</td>
<td>2,498</td>
<td>2,374</td>
<td>2,113</td>
<td>1,766</td>
<td>4,172</td>
<td>3,595</td>
</tr>
<tr>
<td>May</td>
<td>703</td>
<td>1,126</td>
<td>1,000</td>
<td>1,508</td>
<td>1,112</td>
<td>1,222</td>
<td>1,049</td>
<td>1,924</td>
<td>3,132</td>
</tr>
<tr>
<td>June</td>
<td>335</td>
<td>388</td>
<td>196</td>
<td>462</td>
<td>316</td>
<td>401</td>
<td>475</td>
<td>783</td>
<td>950</td>
</tr>
<tr>
<td>July</td>
<td>713</td>
<td>824</td>
<td>255</td>
<td>381</td>
<td>278</td>
<td>452</td>
<td>349</td>
<td>395</td>
<td>1,041</td>
</tr>
<tr>
<td>August</td>
<td>710</td>
<td>769</td>
<td>333</td>
<td>526</td>
<td>334</td>
<td>912</td>
<td>602</td>
<td>762</td>
<td>1,092</td>
</tr>
<tr>
<td>September</td>
<td>3,616</td>
<td>2,677</td>
<td>752</td>
<td>948</td>
<td>758</td>
<td>1,409</td>
<td>1,023</td>
<td>1,436</td>
<td>2,386</td>
</tr>
<tr>
<td>October</td>
<td>5,111</td>
<td>4,101</td>
<td>3,315</td>
<td>4,244</td>
<td>3,361</td>
<td>4,417</td>
<td>4,810</td>
<td>5,603</td>
<td>6,527</td>
</tr>
<tr>
<td>November</td>
<td>2,666</td>
<td>1,926</td>
<td>3,031</td>
<td>3,715</td>
<td>2,575</td>
<td>4,095</td>
<td>3,152</td>
<td>4,289</td>
<td>4,661</td>
</tr>
<tr>
<td>December</td>
<td>661</td>
<td>803</td>
<td>785</td>
<td>980</td>
<td>617</td>
<td>1,164</td>
<td>760</td>
<td>1,041</td>
<td>1,100</td>
</tr>
<tr>
<td>Total</td>
<td>21,568</td>
<td>20,815</td>
<td>14,867</td>
<td>17,698</td>
<td>15,013</td>
<td>19,121</td>
<td>16,356</td>
<td>23,226</td>
<td>27,796</td>
</tr>
</tbody>
</table>


The highly revered Muktinath or Muktichhetra (lit: place of salvation) is one of the most important religious places in Mustang for both Hindus and Buddhists. Thus religious tourism is an important tourism activity in the region. However, until the opening of the Beni-Jomsom Road, the number of Indian and domestic pilgrims visiting place was strictly limited. Their numbers have risen exponentially since completion of the road in 2007. Table 3.4 shows the
tourist arrivals from SAARC\(^4\) nations, primarily Indian, in the past five years. In addition, Kagbeni is important sacred site for the Hindu devotees of Nepal. This is where family members perform the rite to salvage the spirit of the departed soul. They believe that such rites will not be successful unless they visit the Muknath. Since the road opened the numbers of domestic tourists have also increased significantly.

Table 3.4: The 5-year record of tourists (from SAARC nations and primarily Indian) arriving in lower Mustang

<table>
<thead>
<tr>
<th>Months</th>
<th>SAARC</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2005</td>
<td>2006</td>
<td>2007</td>
<td>2008</td>
<td>2009</td>
<td>06 Vs 07</td>
<td>07 Vs 08</td>
<td>08 Vs 09</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>January</td>
<td>5</td>
<td>7</td>
<td>8</td>
<td>4</td>
<td>18</td>
<td>14</td>
<td>-50</td>
<td>350</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>February</td>
<td>1</td>
<td>25</td>
<td>10</td>
<td>3</td>
<td>47</td>
<td>-60</td>
<td>-70</td>
<td>1467</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>March</td>
<td>4</td>
<td>50</td>
<td>200</td>
<td>63</td>
<td>567</td>
<td>300</td>
<td>-69</td>
<td>800</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>April</td>
<td>41</td>
<td>53</td>
<td>857</td>
<td>260</td>
<td>1,465</td>
<td>1517</td>
<td>-70</td>
<td>463</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>May</td>
<td>117</td>
<td>287</td>
<td>449</td>
<td>1,254</td>
<td>2,008</td>
<td>56</td>
<td>179</td>
<td>60</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>June</td>
<td>108</td>
<td>262</td>
<td>412</td>
<td>422</td>
<td>1,542</td>
<td>57</td>
<td>2</td>
<td>265</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>July</td>
<td>71</td>
<td>62</td>
<td>61</td>
<td>442</td>
<td>696</td>
<td>-2</td>
<td>625</td>
<td>57</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>August</td>
<td>33</td>
<td>69</td>
<td>19</td>
<td>213</td>
<td>594</td>
<td>-72</td>
<td>1021</td>
<td>179</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>September</td>
<td>251</td>
<td>50</td>
<td>141</td>
<td>585</td>
<td>1,118</td>
<td>182</td>
<td>315</td>
<td>91</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>October</td>
<td>49</td>
<td>190</td>
<td>198</td>
<td>327</td>
<td>635</td>
<td>4</td>
<td>65</td>
<td>94</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>November</td>
<td>34</td>
<td>82</td>
<td>1161</td>
<td>221</td>
<td>156</td>
<td>1316</td>
<td>-81</td>
<td>-29</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>December</td>
<td>8</td>
<td>6</td>
<td>27</td>
<td>39</td>
<td>350</td>
<td>44</td>
<td>-100</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>722</td>
<td>1,143</td>
<td>3,543</td>
<td>3,833</td>
<td>8,846</td>
<td>210</td>
<td>8</td>
<td>131</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Source: SAARC Tourist Entry Record 2005-2009, NTNC-ACAP, Jomsom Office)

Tourism in lower Mustang is strongly seasonal and climate is as a major factor for this. The concentrations of tourist arrivals are in spring (March – May) and autumn (September – November) accounting for 80 percent of the total visits (see Figure 3.6); tourism in Mustang is constrained by climate.

\(^4\) SAARC - The South Asian Association for Regional Cooperation (SAARC) is an economic and political organization of eight countries in Southern Asia, consisting of Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka.
In lower Mustang, locals have had their rights and responsibilities to manage the area acknowledged. These rights and responsibilities are driven by the principal philosophies of participatory conservation and local level governance forming a crucial component of the bottom-up approach in managing the area. The aim behind the NBT governance lies in educating the stakeholders to operate tourism so that it minimizes environmental damage and promotes conservation practices that ensure long-term sustainability.

The process of participatory conservation and the local level governance in lower Mustang began when the ACAP took the management responsibility for the Mustang district. This became possible in 1992 when Mustang was annexed to the Conservation Area, bringing it under the jurisdiction of the National Parks Act 1973. After the approval of a separate Conservation Area Management Regulation (CAMR) 1996, the management of Mustang was entrusted to the National Trust for Nature Conservation (NTNC) (formerly King Mahendra Trust for Nature Conservation). The CAMR 1996 also provided the legal basis for the Annapurna Conservation Area Project (ACAP) of NTNC to manage the area. The CAMR 1996 stipulates the establishment of 15-member grassroots conservation institutions such as the Conservation Area Management Committees (CAMCs) to manage overall conservation and development oriented activities within each VDC. CAMCs have been involved in the
management of the natural resources of the area (Baral & Stern, 2009). Each CAMC plans, implements, manages and monitors resource conservation and development activities at the VDC level. As provided in the CAMR and based on the CAMC’s need, sector specific institutional arrangements such as the Tourism Management sub Committees (TMsCs) are formed and exercise the tourism management practices.

3.5.5 Tourism Stakeholders

The provision of NBT services and facilities involves a wide range of stakeholders, public and private, directly as well as indirectly. Tourism Management sub Committees (TMsCs), primarily consisting of lodge owner members, represent the local institutions responsible for overseeing the tourism service provision and its management within lower Mustang. There are also other tourism service providers such as restaurant/cafe operators, shop owners (souvenir/retail), guides and porters. They are the key stakeholders working in partnership with non-government institutions such as ACAP, District Development Committees (DDCs), VDCs and local institutions such as CAMCs, Mothers Group (MG) and traditional institutions such as Mukhiyas. Mothers Groups, previously known as the women’s organization, exist since the 1970s (Kvaloy & Sandvik, 1992) and are the key partners of CAMCs and TMsCs. They are responsible for the village environment through waste management, forest plantation and protection, operating safe drinking water stations, culture preservation through operating museums, maintaining local traditions and festivals.

3.5.6 Chapter Summary

The chapter provided broad overview of lower Mustang with a detailed account of the NBT supply system, its governance and stakeholders’ characteristics. From the overview, it is apparent that lower Mustang is one of the most spectacular regions of the world famous Annapurna Conservation Area. The region is distinct from geological, geo-morphological, socio-cultural and economic perspectives. The region is divided into an upper northern semi-arid and lower southern densely forested area. Being a mountainous region, lower Mustang’s landscape is very diverse and very sensitive because of its fragile landscape and environment, limited resources and marginal land holdings. The Kali Gandaki River flowing through the valley is the lifeline of the thousands of people residing their as well as for the vegetation and faunal diversity of the region.
The diverse landscape gave lower Mustang its unique character making it an important destination for thousands of tourists who visit the region for trekking, mountaineering, etc. Most of the stakeholders also rely on more than one livelihood option such as tourism, horticulture, farming and trade are the major livelihood options of the people.

Tourism is the major source of livelihood for people residing in lower Mustang. It has generated a huge amount of money that has been key in conserving the forests and other resources while it has also provided support for the livelihood of thousands of people. The NBT supply system of lower Mustang is a composite mix of natural, tourism and human systems and their assets. The supply system largely depends on natural and cultural resources such as mountain scenery, landscape, climate, biodiversity, indigenous culture and lifestyles, upon which tourism activities and the infrastructure rely. The construction of the Kali Gandaki Highway and the changed geo-political context is developing Mustang into a major trade transit point connecting two Asian economic giants India and China. These assets coupled with the interaction between natural and human system produces a distinct NBT supply system.

The chapter also discussed the governance of NBT with the participatory management philosophy of the ACAP, which has made it possible for the local community to actively engage in the management and also play a key role in decision-making. Local people have had their rights and responsibility to use the resources and manage NBT acknowledged. Several important statutory provisions such as the country’s National Parks and Wildlife Conservation Act 1973 and CAMR 1996 have been crucial in facilitating the formation of key grassroots institutions such as CAMCs, TMscs, MGs to administer and manage tourism in lower Mustang. Each CAMC plans, implements, manages and monitors conservation and development-related activities at each VDC level. Tourism specific programmes, planning and management roles are undertaken by the TMscs as well as MGs.
PART B: Methodology

Chapter 4

4.1 Introduction

The literature reviewed in Chapter 2 suggested that vulnerability is a dynamic and multidisciplinary concept. The chapter also provided a conceptual basis that assists in formulating the vulnerability assessment framework for this research. However, the literature reviewed also suggested that the assessment framework should be an applied concept since there is no single model that can be applied universally.

This chapter is divided into two sections. Section 4.2 grounds the study into the climate change vulnerability assessment framework and discusses how the framework has been developed for this case study. Section 4.3 provides the literature on qualitative research methods, as well as the application of this method to the study. It also provides a short discussion of various methodological and ethical issues encountered during data collection.

4.2 Climate Change Vulnerability Assessment Framework

The diverse conceptualisation of the term and its use in different research fields means that no one conceptualisation fits to assess all vulnerability contexts. The first step, therefore, is to develop a framework tailored to the characteristics of the system in question (Tyler et al., 2007), in this case the NBT supply system in lower Mustang. As a basis for this study, the vulnerability definition, provided by the IPCC, which is a broader concept (Füssel & Klein, 2006), is adopted. A comprehensive representation of all the factors affecting the system (e.g. non-climatic, climate change and climate variability) and analysis using a broader concept therefore increases its relevance for the tourism stakeholders of lower Mustang. The present study attempts to undertake a broad analysis of vulnerability. It is informed by the conceptualization of both the political economy, which looks at the contextual vulnerability (Füssel, 2009), and human ecology approaches that emphasise the importance of understanding perception, attitudes and behaviour, and takes into account knowledge, observations and participation of the people who are part of the system (Füssel, 2007). Figure 4.1 depicts the framework and the main concepts considered in the vulnerability assessment process for this study. This framework looks at the vulnerable system, the NBT
supply system\(^5\) of lower Mustang, which is experiencing a phenomenal phase of social change driven by multiple stressors, both human and natural. The general assessment framework is not exhaustive but indicative of what has been perceived by the tourism stakeholders. It attempts to pinpoint the main vulnerability contexts from their perspective. It is important to note that the framework addresses all three aspects, i.e., exposure, sensitivity and capacity of the vulnerability contexts.

(Adapted from, Ionescu, et al., 2009; Füssel & Klein, 2006; Metzger, et al., 2005).

**Figure 4.1: Vulnerability assessment framework of Nature Based Tourism supply system to climate change based on tourism stakeholders’ perspectives**

Based on the stakeholders’ perceptions, the assessment begins by looking at the NBT supply system’s *exposure* to the various drivers of change perceived as stressors. In Figure 4.1, the exposure represents the noted drivers of change including climatic change. The system is also exposed to the non-climatic factors as they are external to the NBT supply system. The *sensitivity* of a system in this case is the NBT supply system of lower Mustang. And as the Figure shows, non climatic factors (e.g., socio-economic change, level of education, strength of social networks) may determine the sensitivity of a system or groups to climate change, but

---

\(^5\) The NBT supply system is a complex system in which the dynamics of the natural, tourism and human or social system are interlinked. See Figure 2.1 of section 2.2.
with sensitivity to climate change, large scale processes associated with global change, (e.g.,
globalization, urbanization, regime change and conflict) are particularly important.

The vulnerability of the NBT system to climate change has as much to do with the exposure
and sensitivity of that system as with adaptive capacity. Vulnerability may decrease in areas
with stronger community/traditional institutions, their social, economic and political
empowerment, increased access to social security (entitlements, safety nets), information and
technology. The decreased vulnerability means an increase of adaptive capacity of such
community/institution that increases their resilience. But as Handmer (1999) suggested, these
adaptive capacities may be unevenly distributed, which highlights the need to recognize the
varied nature of impacts. Adaptive capacity explored the different determinants of capacity
such as demography, knowledge and awareness, social security networks and management
and institutional support.

Rather than looking at the vulnerability of NBT to climate change as a technological
challenge, the study focused on understanding the vulnerability by investigating the
awareness, knowledge and attitudes of different tourism stakeholders, through their
perception of, the constraints they work under and their capacity to cope as well as adapt to
the consequences of climate change. This is because “the best strategy to understand the
complex world is from the perspectives of those who are being studied,” (Phillmore &
Goodson, 2004).

The scope of the current study necessitated using the ‘bottom-up’ approach, increasingly
advocated for (IPCC, 2007a) and used in the climate change impact and adaptation process
(Coombes et al., 2004). In line with this concept, Hertin et al., (2003) stated that “…the
challenges posed by the climate change can only be adequately understood if the process of
assessment is analysed not only at the macro level but also at the micro (local) level.”
Building on this principle, the assessment began at the community level, examining the
conditions that gave rise to the vulnerability contexts (Coombes et al., 2004).

4.3 Qualitative Research Approach

From the literature reviewed in Chapter 2, one can contend that the NBT supply system,
vulnerability and perceptions are complex multidisciplinary concepts with factors such as
social, environmental, political, economic, values and belief, all of which interact with one another. The existence of these varied perspectives necessitates understanding of them and holistically producing the local knowledge. In other words, it requires gaining an in-depth understanding of how people make sense of their world (Munroe-Chandler, 2005). The current study is informed by the qualitative research paradigm because this study sets out to understand the vulnerability context for the NBT supply system through the stakeholders’ perspectives.

The need for a holistic assessment of the vulnerability contexts meant that the qualitative research approach is highly appropriate. Similarly, since the research topic is new for lower Mustang, the qualitative research approach is useful to elicit information about how the stakeholders understand climate change locally and globally, its dynamics, perceived reasons for the changes (whether climate or non climate), current and future impacts of climate change and their response to such impacts (coping or adaptation). Table 4.1 shows the research approach employed. The assessment was both inductive and exploratory because there is little prior knowledge and information on this topic. A multi-methods approach with a variety of qualitative methods such as analysis of documents, direct observation, in-depth interviews, personal conversations and photograph narration have been used.

Table 4.1: The qualitative research approach for the study

<table>
<thead>
<tr>
<th>Elements of Vulnerability Assessment</th>
<th>Vulnerability Contexts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Natural System</td>
</tr>
<tr>
<td>Indicators</td>
<td>Physical resources</td>
</tr>
<tr>
<td></td>
<td>Biological resources</td>
</tr>
<tr>
<td>Process</td>
<td>Field visit –</td>
</tr>
<tr>
<td></td>
<td>Data Analysis –</td>
</tr>
</tbody>
</table>

4.3.1 Exploring the contexts

The extensive literature review before; during and after the field work served as secondary data for the study. The literature reviewed related to climate change and tourism (especially nature and sustainable tourism), the impacts of climate change, risk perception, public
understanding of climate change, vulnerability, climate change and natural disasters. As far as possible, the focus of the review was on studies conducted in the ACA or other destinations in Nepal. However, considering the dearth of information and studies conducted in climate change and tourism, literature from other jurisdictions useful for this study was reviewed. Journals, books, government and non-government organization publications, a range of local materials (newspapers, television news and online news, articles) were reviewed. Online databases (such as “Google scholar”, “Science Direct” and “Web of Science”) and other web sources such as WTO, UNEP, IPPC, ICIMOD, Lincoln University, and the archival data have reviewed. In addition, the libraries of NTNC, ACAP (Pokhara and Jomsom), Institute of Forestry, ICIMOD were used to gather wider relevant literature.

Before the field visit, contact was made with relevant institutions to inform about and get permission to conduct the intended research. No Human Ethics Committee (HEC) approval was sought for the preliminary stage.

### 4.3.2 Investigating Stakeholder’s Understanding of Climate Change

After having become familiar with the context, the next step was to gain access to the research area (lower Mustang region). As discussed in section 1.2, my familiarity with the place and people greatly helped to facilitate the research in selecting the study area, understanding the research context, gaining access to the area and establishing rapport and building trust. It is this being an ‘insider’ that allowed the field work to finish within the set period. In total, the data collecting continued for six weeks in Mustang, followed by two weeks in Pokhara and two weeks in Kathmandu. My principal role as a research student of Lincoln University, allowed me to play an ‘outsider’s’ role and be objective enough to collect the data professionally.

The qualitative research tools such as direct observation and in-depth interviews (Belsky, 2004) and personal conversation were used to develop a holistic perspective of the context. HEC approved the use of these tools.

#### 4.3.2.1 Direct Observation

Because very little is known about tourism stakeholders’ perceptions of the vulnerability aspects of the NBT supply system, direct observation entailed observing the tourism
stakeholders’ attitudes and behaviour grounded. An overt observation strategy was used, while visiting the selected stakeholders’ houses/hotels/shops and also institutions working in lower Mustang. As suggested by Jorgensen (1990), such an overt strategy raises few ethical problems and is useful in gaining support for the study from the participants’ perspectives. The information thus gathered has been purposeful in both informing the understanding of the study contexts as well as feeding the analysis.

Note-taking of the activities and incidences observed, stories and information obtained was also carried out as part of the direct observation. These notes later served to both inform understanding of the study contexts as well as assisting in interpreting information derived from other sources (documents, interviews, etc.) during the analysis.

### 4.3.2.2 In-depth Interview

Thirty participants were selected for an in-depth face-to-face interview. By emphasising multiple sources of information and research participants, a broad array of evidence, which looks for and takes into account disconfirming as well as confirming data, ensured that enough participants were selected (Hartley, 2004). In other words, interviews continued until informational redundancy or saturation was achieved. The face-to-face interview, using open ended questions, follow up probes for issues raised by the informants and paraphrases for verification (Kempton, 1991), was used. An interview guide, with relatively structured defined topics and probes to follow-up responses (King, 2004), was used to elicit detailed information from participants (see Appendix A).

The interview guides were structured to extract broad information about the state of the NBT, followed by the questions to elicit the stakeholder’s specific knowledge and awareness about climate change issues, and their capacity to respond and adapt to their impact. The interview guide consisted of three parts. First, I asked questions about historical and general background information regarding the NBT and its state. This part explored the understanding of the existing conditions of the NBT supply system and the dimensions of the vulnerability contexts. The second part had questions related to weather observations (especially changes in events, rainfall and snowfall patterns) and natural disasters, in general, and the stakeholder’s recall of information and its source. The purpose of these questions was to investigate the stakeholders’ awareness and knowledge about climate change issues. The third part focused on gathering information on the impacts of and response capacity of the stakeholders to
climate change. The inquiry concluded by investigating the importance of climate change for
the stakeholders, in the context of a wide range of other vulnerability factors influencing the
NBT supply system. Questions were open ended in order to gain more spontaneous opinions
and avoid potential bias from restricting responses to the researcher’s fixed categories (Ryan,
1995).

4.3.2.3 Participant selection

Potential participants were chosen using a purposeful and snowball sampling technique. As
Flyvberg (2004) suggested, when the objective of the study is to achieve the greatest possible
amount of information on a complex phenomenon, a random sample may not be the most
appropriate strategy, because the typical or average case is often not the richest in
information. Several contexts such as insight gained from having reviewed the literature (prior
to starting field work), my own knowledge and experience of having worked in this region
and the preliminary discussion held with the officials of ACAP (in Pokhara and Jomsom) and
the stakeholders themselves, assisted in informing my knowledge to identify and select the
participants. The purposeful sampling allowed selecting representative stakeholders from
wider geographic distribution, mix of public and private tourism service providers, and
breadth of socio-economic and demographic status, engagement in NBT management within
lower Mustang. Similarly, the study being the first of its kind with very little knowledge about
the perception of the tourism stakeholders to the climate change issues, a snowball technique
has been applied to help identify the participant who are most informed about the subject
matter or are familiar with the issue.

As the main focus of this study is to assess the vulnerability aspects of the supply side of NBT
to climate change, those tourism stakeholders who have a significant interest in NBT service
operation in lower Mustang, or decisions made concerning its management have been selected
for the study. The sample frames of those selected for this study include (see Plates 4.1, 4.2
and 4.3):

- Public service providers: CAMCs, TMsCs, MGs, Mukhiyas
- Private service providers: Hotel/Guest house owner, Restaurant/Teahouse owners,
  Retail/Souvenir shop owners, Guides and porters

Appendix B provides the detail lists of stakeholders interviewed.
Once a particular participant was selected, s/he was approached. After a self introduction, it was explained to the participant that the interview was being conducted to gather data for a Masters thesis. S/he was provided with a brief information sheet about the study (see Appendix C). Then s/he was invited to take part in an interview. However, throughout the interview process, care was given to ensure that there was voluntary participation. Purposeful sampling meant that most participants chosen were familiar with me to some extent. None of the chosen participants declined to take part in the study.

The interviews took place where the participants felt comfortable with (e.g., at home, in the community hall, in the field, alongside the road, in the kitchen) and were digitally recorded. On average, the interviews were forty five minutes long; the longest one was one hour and twenty five minutes and the shortest fourteen minutes. The study scope excluded the need to involve tourists as participants, despite them being one of the key stakeholders in the tourism system.

4.3.2.4 Conversation with Institutional Representatives

During the six weeks spent in lower Mustang, I also visited several institutions in Jomsom such as DDC, District Forest Office, District Agricultural Office, Marpha Horticultural Centre, ADB-Tripple R Project and ACAP-Jomsom, to gather information. Conversations with representative staff of these institutions provided rich information about the research contexts. In Pokhara, ACAP’s head office was chosen as my main station before and after my field visit to lower Mustang. During this period, several conversations were held with technical staff of ACAP, Pokhara. In Kathmandu, I visited the NTNC office, and interviewed the climate change coordinator and had conversations with other officials. In addition, several
NGOs (Practical Action, WWF Nepal) and INGOs (ICIMOD) were also visited. Interviews and conversations were conducted with representatives of these institutions.

4.3.3 Ethical Considerations and Strategies

In line with the current accepted practice in research involving human subjects, a range of precautions were taken (Espiner, 2001), to protect the sensitivities of participants. Before beginning the interview, the respondent was provided with an information sheet containing detailed information about the study and how the privacy of the participants’ information would be maintained. Once they agreed to give an interview, each participant was asked to read and sign a consent form (see Appendix D). During the interview to ensure that the information given by the participants remained confidential, their names have been coded using an identity that reflected their generic title.

However, it is also important to note that the HEC guidelines and the formality of undertaking the procedures such as the issue of participant confidentiality and getting an informed consent and especially asking local village elders to sign a piece of paper (which many could not read) created an awkwardness as well as bewilderment among many. I am thankful to note that my familiarity with the place and people was the great testimony of trust, as a result of which they found this procedure more bewildering than suspicious. Instances such as, “Why do I have to sign my name? You know me.”, while asking them to give the written consent, or, the impromptu query, “Is this going to be broadcasted on the radio?”, after having seen the digital recorder; reflects the cultural differences and the reality of this region. In a society where work is accomplished through mutual relationship and trust; where people love attention, publicity and of having their names published, the whole process of informed consent and confidentiality, appeared very unorthodox. This highlights the issue of cultural sensitivity and the problem of the general applicability of the HEC procedure, especially if the research is to be conducted outside New Zealand.

4.3.4 Data Analysis

Thirty interviews were analysed. Data collection and analysis were conducted simultaneously. Analysis of data is a systematic process comprising different methodological steps such as transcribing, data arrangement, coding, thematizing and data collation and analysis. While transcribing the interviews, ideas that emerged or methodological issues encountered were
noted as a comment that provided references while writing the summary note of the overall transcribed interview. The analysis process involved exploring the actual viewpoints on the specific issues, identify the patterns among the data that point to the theoretical understanding (Babbie, 2007) of the study, categorising it into codes, which were clustered into concepts and finally aggregated into more general classifications of themes (Kloprogge & Dersluijs, 2006). The concepts then acted as the dimensions of a particular theme. The analysis of the interviews in the form of thematizing concentrated on broad commonalities in stakeholders as well as looking at issues where individual differences between and within stakeholder groups appeared. The analysis is informed by the conceptualization of political economy and human ecology. Yuksel et al., (1999) suggested that there are broad cognitive systems of concepts, statements or explanation that underpin the everyday social knowledge of the stakeholder. The analysis focused on broad clusters of information that may link or divide stakeholder groups (Yuksel et al., 1999).

4.4 Limitations of the Study

The study suffered from some methodological limitations that are important to mention here.

4.4.1 Sampling Bias

As shown in stakeholders’ profile, biases in gender are not significant, but there is a much higher representation of the hotel/lodge and retail shop owners as opposed to guides and porters. The reason is that data collection occurred during the off tourism season months of June-July. This posed as a constraint in finding reasonable numbers of local guides and porters who could be approached for the interviews. As the timing also coincided with the harvest season (see Table. 5.1.), many of the guides stayed in their respective villages doing agricultural work, while porters were busy transporting goods in Beni and Pokhara.

4.4.2 Value Laden Interpretation

Empathic neutrality is the most disputed feature (Bitsch, 2001) of this approach. Although one is required to be aware of one’s own biased opinion, it is important to note that personal experience and emphatic insights are important features that characterize the qualitative
research approach and also help better understand the phenomenon. Therefore qualitative inquiry and interpretation of the data to some extent are value laden.

4.4.3 Credibility of the Data

To ensure credibility of the data, strategic research methods such as triangulation have been practiced. The triangulation method included multiple data collection (such as in depth interview, direct observation, personal conversations, photograph narration) and analysis methods (Golafshani, 2003). The reliability and validity of the information in this study have been ensured based on techniques such as prolonged engagement, persistent observation and peer debriefing (Guba & Lincoln, 1989, as cited in Bitsch, 2001). I spent two months collecting data in lower Mustang and my experience of working in this area for four years helped generate enough insight and further helped analyzing the information in depth.

Circulation of the draft among peers was carried out during the writing process.

4.4.4 Ethical Issue

The problem in applying the HEC guidelines and procedures has already been discussed in section 4.3.3.

4.5 Chapter Summary

This chapter discussed the application of the vulnerability assessment framework to the case study i.e., the vulnerability of NBT to climate change impacts and adaptation in lower Mustang. The framework illustrated the scope of the vulnerability assessment of the NBT supply system and pin-pointed the main vulnerability contexts (e.g., non climatic and climatic factors) from the stakeholders’ perspectives; its exposure and sensitivities to climate change and the adaptive capacities. The chapter also defined vulnerability in the context of this study.

The research approach and methods selected were outlined. The scope of this study, informed by the conceptual basis of contextual vulnerability and human ecology, necessitated using qualitative research methods. The approach is useful to elicit information on how stakeholders understand climate change in their area and globally, its dynamics, perceived reasons for
changes (whether climate or non climate), current and future impacts of climate change and their response to such impact (coping or adaptation).

The chapter also discussed the use of qualitative research tools such as direct observation and in-depth interviews and conversations to develop a holistic perspective of the research context, followed by the discussion of the ethical considerations and data analysis. The chapter concluded by highlighting the methodological limitations encountered during the data collection and analysis.
PART C: Results and Discussion

Stakeholders’ Perceptions of Vulnerability of the NBT System

In seeking to understand how the multiple drivers of change (e.g. non-climatic and climatic factors) increase the vulnerability contexts of local tourism stakeholders, the findings from this study are divided into two chapters. Chapter 5 explores the social dimensions of change in lower Mustang. Chapter 6 investigates tourism stakeholders’ perceptions on the vulnerability of NBT supply system to climate change in lower Mustang. The two results and discussion chapters address different research questions (Espiner, 2001), as an attempt to provide a comprehensive assessment of all the factors affecting the system and therefore addresses the second and third aim of this study. The key findings of these chapters are combined in the concluding chapter, Chapter 7, to provide a broader understanding of the stakeholders’ perspectives of the dimensions of vulnerability in the NBT supply system of lower Mustang and how the issue of climate change features.
Chapter 5
Perceived Vulnerability of NBT System to Social Change

5.1 Introduction

The aims of this chapter are twofold. First, it examines a small subset of topics covering the social dimensions of change in the face of rapid socio-economic and climate change in lower Mustang, from tourism stakeholders’ perspectives. Second, it synthesizes the findings to analyze the vulnerability context of NBT from social change perspectives.

Before assessing the vulnerability contexts for the NBT supply system, examination of the livelihood patterns of the stakeholders and their socio-economic status was carried out. Based on secondary literature, field observation and interviews, the livelihood patterns of these stakeholders are derived (see Table 5.1). The Table shows that the stakeholders’ livelihoods are driven by the very effective and flexible seasonal calendar that is in tune with the changing seasons and harsh environmental conditions of the area.
Table 5.1: Seasonal calendar of lower Mustang

<table>
<thead>
<tr>
<th>Seasons</th>
<th>Winter</th>
<th>Spring</th>
<th>Summer/Monsoon</th>
<th>Autumn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weather</td>
<td>Clear and stable, freezing cold at night, suitable for trekking below 2500 meter</td>
<td>Warmer temperature, dry, longer days, Nepal's national flower Rhododendron colour the mountains and different species of bird migrate to their high altitude breeding areas</td>
<td>Low rainfall, best time to visit to enjoy the trek, because there are few other tourists, and nature is at its best with flowers and butterflies, but mountain views are rare</td>
<td>Temperatures are not yet too cold in the high areas, clear weather, dry, excellent mountain view, best trekking season</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hotel/Lodge Operators</th>
<th>Southern Area - Ghasa, Lete, Kunjo, Larjung, Kobang</th>
<th>Northern Area - Tukuche, Marpha, Jomsom, Kagbeni, Muktinath</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hotel/Guest House Operation</td>
<td>Maize plantation Barley Harvesting</td>
<td>Hotel/Guest House Operation Maize harvesting Barley Plantation</td>
</tr>
<tr>
<td>Wheat/Buckwheat Harvesting</td>
<td>Wheat/Buckwheat Plantation</td>
<td></td>
</tr>
<tr>
<td>Barley Plantation</td>
<td>Harvesting of Peach and Apricot</td>
<td>Apple and Buckwheat Harvesting, and Barley Plantation</td>
</tr>
<tr>
<td>Hotel/Guest House Operation</td>
<td>Maize Plantation Barley Harvesting/ Buckwheat Plantation</td>
<td></td>
</tr>
<tr>
<td>Potato Plantation</td>
<td>Potato Harvesting</td>
<td></td>
</tr>
<tr>
<td>Guide</td>
<td>Agriculture Guiding Agriculture/Trade Guiding</td>
<td></td>
</tr>
<tr>
<td>Porter</td>
<td>Portering goods for sale from Beni/Pokhara Portering</td>
<td></td>
</tr>
</tbody>
</table>

(Source: Lama, 2006, direct observation and in-depth interview)
As the Table showed, most tourism stakeholders of lower Mustang are multi-entrepreneurs, engaged in various supplementary livelihood activities. Relating to this situation, a hotel owners from Tukuche explained:

“To tourism alone is not sufficient to sustain livelihood. Only 10-15 percent of the business owners solely rely on tourism and can sustain from it. We have to engage ourselves in 2-3 occupations to sustain our livelihood” [TPB – Hotel Owner/CAMC Chairman, Tukuche].

And depending on the number and types of supplementary livelihood activities these stakeholders are involved in, they can be categorised as rich, middle income and low income households (see Table 5.2).

**Table 5.2: Stakeholders’ typology and their involvement in multiple economic activities**

<table>
<thead>
<tr>
<th>Socio-economic status⁶</th>
<th>Types of Stakeholder</th>
<th>Supplementary Livelihood Options</th>
</tr>
</thead>
</table>
| **Rich Households** (n = 15) | Hotel/Lodge Owner, Mukhiyas (Village Headmen) | • Own Retail shops/stores  
• Own apple orchards, distillery, above 5 ha of agricultural land and livestock  
• Operate travel/ticketing and money changer service  
• Own truck, jeep or bus and motorcycle  
• Work as construction and ration contractors  
• Have family members working abroad, either in Japan, Korea or USA |
| **Middle Income Households** (n = 13) | Small Lodge/Inns Retail shop owners | • Own agricultural land, apple orchards and livestock  
• Have family members working abroad  
• Own motorcycle |
| | Guide | • Trade  
• Own small farmland |
| **Low Income Households** (n = 2) | Local Inns | • Rent lands for agriculture  
• Own a small apple orchard  
• Take casual jobs  
• Collect and sell fuel wood |
| | Porters | • Labour jobs  
• Work in the farm |

(Source: NTNC, 2008, direct observation and in-depth interview)

⁶ Rich household comprise about 50% of the socio-economic group, while middle and low income make up 43% and 7% respectively.
5.2 Tourism Stakeholders’ Perspectives on Social Change

5.2.1 Vulnerability due to Socio-economic and Land-use Change

In the last four decades, significant changes have been observed in the socio-economic conditions of the stakeholders as well as in land use in lower Mustang. As informed by the stakeholders, the change is mainly driven by factors such as the transition of the area from being a remote mountain area with traditional subsistence farming mixed with seasonal migration to one characterized by a mixed economy dictated by tourism, farming, horticulture and trade. In addition to this, the current rate of socio-economic and land use change has increased dramatically. Factors such as the road development, migration and globalization of local economy are some of the key driving factors affecting the dynamics of the NBT system of lower Mustang.

5.2.1.1 Road development

Note: Map is not to scale                           (Source: Adapted from NTNC-ACAP’s brochure)

Figure 5.1: Map of ACT route over which the Beni – Jomsom and Besisahar – Manang Roads have been constructed
The Beni-Jomsom road is viewed as the biggest and the most important factor affecting the NBT system and its stakeholders within the area. It has brought a significant alteration in the way that tourism is carried out, both in terms of tourism service provision/development and the types of activities. The operation of this road has already shortened the trek duration of the Muktinath – Ghasa stretch of the Annapurna Circuit Trek (ACT). The trek, normally done in 4-5 nights, has now been reduced to 1-2 nights. The 17-day long trek duration of the entire ACT (Manang and Mustang districts combined) has now been reduced to about 5-6 days, due to the Besisahar-Manang and Beni – Jomsom Roads (see Figure 5.1). One hotel owner of Marpha shared his experience stating:

“Tourists nowadays drive directly from Muktinath or Jomsom to Ghasa and spend the night in Tatopani. Almost 50 percent of the trekkers now travel in this way. Some tourists do come walking as far as Marpha but from here they go by jeep. I personally booked at least 30-40 jeep trips” [LS - Hotel Owner/Mukhiya/TMsC Chairman, Marpha].

The loss of trekking days is a major setback for different stakeholders such as hotel/lodge operators, local inns, trekking guides and porters. The lodges operating along the villages of Marpha, Tukuche, Kobang and Lete VDCs (see Table 3.2) have suffered the major loss and the local inns and restaurants providing services to local guides and porters have almost disappeared. Sharing this experience an interviewee explained:

“Prior to the construction of the road, most of the small houses along the route lived on operating local inns for the porters and guides. Now that the road is here, their businesses have been most affected. In fact, many of these local inns and tea shops have been shut down” [TR– Hotel Owner, Larjung].

The operation of the road and thereby the reduction in number of trekking days meant a limited number of trekkers, guides and/or porters pass through these villages. A local guide offering guiding services in Jomsom mentioned:

“Compared to previous years, the booking is very low this time. Earlier, I used to get enough clients for trekking in the Jomsom area only, but now I am slowly diverting my area of work to other trekking destination areas such as the Everest region or other new areas” [NH – Trekking Guide, Lete].
This move to expand the area of work was mainly driven by the destruction of the ACT route and also tourists diverting their trip to other trekking areas. The impacts of road development are thus varied and widespread, depending on the types of services the stakeholders are offering, as well as their socio-economic conditions. The displacement effect is currently localized and has hit those tourism stakeholders who are at the lowest end of the economic spectrum such as the local inns, guides and porters.

The road has also changed the way tourism activities are carried out. From being considered as frivolous and relatively unimportant (Butler, 2009), domestic and religious tourism is beginning to become recognized as a major social and economic force and villages such as Ghasa, Jomsom, Kagbeni and Muktinath as the major stopovers for the jeeps and buses driving along the routes such as Beni-Jomsom road.

Although there is no system to collect data about domestic tourists, hotel owners from Muktinath claimed that their numbers have increased since the opening of the road. Sharing this experience, a hotel owner from Muktinath explained:

"These days some 150-200 pilgrims visit this place on a daily basis. The numbers equivalent to what we used to see during the festival time of yesteryears is the number which we see now, every day" [TJ – Hotel Owner/TMsC Chairman, Muktinath].

This means a total of about 6000 pilgrims visit Muktinath per month. The annual arrival number of SAARC tourists shows exponential growth (see Table 3.4), with 2009 showing 8846. As the population of Muktinath is just 1089 (DDC-Mustang, 2001), the local population-tourist ratio indicates that the area receives six to eight times higher number of pilgrim tourists (both domestic and Indian tourists) than the actual population. If one is to take into account the bed capacity of the villages of VDCs such as Muktinath, Kagbeni, Jomsom and Marpha (see Table 3.2), the demand for pilgrimage accommodation exceeds supply by 382 percent.

The overwhelming arrivals of domestic and Indian tourists have not only changed the demographic patterns of the tourists visiting this region, but also the scope of business and its seasonality. Previously, hotel/lodge owners relied totally on international tourists but not anymore. Some seasons, such as spring (March-May) and autumn (September-November), which were traditionally unpopular among Indian tourists but were the main seasons for
international tourists, have changed their demand pattern (see Figure 3.6). Sharing this view, an interviewee from Puthang explained:

“Since the operation of the road, maximum Nepalese tourists have come here. Well before (and even now) the Nepalese tourists used to visit during particular festival time such as ‘Dashain’, ‘Chaitra Dashain’, ‘Ram Nawami’ and so on. But with the recent operation of the road their arrival have spread beyond the recognized season/months of the year” [GS – Hotel/Retail Shop Owner, Puthang].

These developments indicate that motorized transport is going to become the most popular means of travel transport in Mustang. Currently, there are 56 jeeps operating between Ghasa and Muktinath (27 between Jomsom and Muktinath and 29 between Ghasa and Jomsom), 2 microbuses (12 more being added) between Beni and Jomsom and 10 Toyota Corolla taxis (see Figure 5.2). The figure shows that, until 2007, horses and mules represented the major means of transport (see Plate 5.1), which were replaced by different motorized transport. The figure also shows significant growth in the numbers of jeeps from nine (which were airlifted to Jomsom) in 2007 (see Plate 5.2), to fifty-six in 2008. Given the strong growth in the arrival of domestic and Indian tourists, 14 new microbuses are to be added, of which two have already started plying the Beni-Jomsom route. While operating the microbus services, heated discussion occurred between the Jeep Management Committee and the Microbus Management Committee, regarding who has the rights to operate the business.

(Source: Employee’s Club, Mustang, 2007 and personal conversation)

Figure 5.2: Changing means of transportation in lower Mustang
There are no legal regulatory bodies and policies governing vehicular movement, given the fact that the road has not been officially handed over to the Department of Roads. Capitalizing on the weak governance situation in the villages, the operation of vehicles among stakeholders has increased rapidly. This situation is reflected in the comment of one of the interviewee from Puthang, who said:

“Until few days ago we had some 50 or so Jeeps running between Ghasa and Jomsom, and now some 14-15 micro buses going to be added. I don’t think anyone can control it. The administration office should have given strict orders as to how many vehicles to allow to run at the beginning itself. But who is going to obey the order in the current climate of political instability?” [GS – Hotel/Retail Shop Owner, Puthang].
As a short term arrangement, the DDC Mustang, with District Administration Office, ACAP and other key stakeholders, agreed on a proposition to allow only four stroke Euro standard vehicles to run on the road. The fact that there is no designated enforcement body and the ongoing political instability have weakened implementation of the new rule.

Since the opening of the road Ghasa, Jomsom and Muktinath have become the busiest villages in the lower Mustang region. A retail shop owner from Marpha expressed her feeling:

“The only places where the road has brought benefit are Jomsom and Muktinath and in and around the jeep station of Ghasa” [LS – Retail Shop Owner, Marpha].

Having the road also means accelerated urbanization in this area. The scale, scope and pace of development are beginning to change the outlook of these villages and their landscapes. There is no proper area or infrastructure for jeeps and buses to park. For instance, in Puthang the ‘station’ is right in the heart of the village, but in Muktinath, at the entry to the village (see Plates 5.3 and 5.4). Local inns/restaurants and hotels are increasing, which is more apparent in Ghasa and Muktinath.

Sustainable management of some of the heavily used areas such as Muktinath, Kagbeni, Jomom and Ghasa, in the context of the rapid influx of changed tourism dynamics, is going to be the biggest future challenge. The Beni-Jomsom-Korolla road will be a part of the major national highway and Mustang is one of the few mountain districts in Nepal that can be reached in a day’s drive from Kathmandu (NTNC, 2008). Similarly, the very nature of Nepal’s linkage to two of the world’s economic giants, China and India, is likely to transform the quiet, isolated mountain community into a major transit economy. This could mean a significant increase in international tourists interested in passive activities or short treks.

The study of the aftermath of the opening of the Qinghai Tibet Railroad (in 2006) shows the effect of the exponential growth of tourists in a previously isolated mountain region of Tibet. The region attracted 4 million tourists in 2007 to Tibet with a population of 2.8 million (Hall & Lew, 2009). Such a rapid influx of tourists has raised concerns about rising pressures on Tibet’s attractions, infrastructure, culture and environment (Hall & Lew, 2009). A survey conducted by ACAP to understand tourists’ perceptions regarding the road development and tourism found trekkers feared the place being over crowded by tourists and also exceeding its carrying capacity (Poel Van der, 2006).
The current rate of increased tourism activity is putting considerable pressure on the already constrained resources such as water and forests for timber supply. The impact of water scarcity due to both increasing demand and changes in climate (see section 6.3.1.1), is being felt in villages such as Muktinath, Kagbeni and Puthang. Therefore, the concentration of the tourists can place a considerable strain on the local environment with implications for water supply, congestion, waste disposal as well as strain on tourism services and infrastructure (Amelung, Nicholls & Viner, 2007).

Road access and the urban sprawl are other important changes experienced by stakeholders. The Sustainable Development Plan prepared by NTNC acknowledges as one of its objectives the management of the growing settlements in an environmentally friendly manner (NTNC, 2008). For this, strategies such as the implementation of building codes, land use zoning and settlement plans have been considered to maintain urbanization and settlement growth in Mustang. However, the combined effects of the lack of funding (to operationalize the plan) and weak governance have resulted in the proliferation of unplanned settlements, unregulated traffic and congestion creating immediate impacts on the land use. The increasing trend of diversifying economic opportunities and the interest in the business establishment is likely to accelerate and intensify the land use change. This is a huge threat to nature-based tourism as well as a crucial potential factor to enhance the climate change process.

5.2.1.2 Migration

Migration is perceived as one contentious problem by a majority of stakeholders. To date, people of lower Mustang have been subjected to both in and out migration. Since the rise in the popularity of trekking tourism during the 1970s, waves of changes in terms of economic activity and land use have been observed in lower Mustang. Villages off the road were abandoned while those along the trekking routes, such as Muktinath, Kagbeni, Jomsom, Marpha, Tukuche, Kobang, Lete and Ghasa, increased. Before the proliferation of trekking tourism, villages such as Puthang and Lete did not even exist. As told by a stakeholder, the Lete area was one of the most underprivileged in lower Mustang. However, the popularity of ACT and the growth of trekking tourism changed this area into an important destination.

In contrast, mass exodus of youths partly due to the conflicts and partly in search of foreign jobs in Gulf countries, India and the British army, US, UK (NARMA, 2008), and for better education has crippled many villages in this region. Approximately 1000 people representing
almost 40 percent of the total households are abroad (NTNC, 2008), leaving some villages, such as Marpha, Lete and Tukuche, mostly with old people. Old age and lack of the younger generation to take over the family business (e.g. hotel/lodge operation) are a big challenge in operating tourism services in these villages. An interviewee explained:

“Whether it is the case of operating a hotel or looking after the apple orchard, one has to be young and fit to do these jobs. Having an apple tree in the orchard does not mean that we will start having apples. One has to do the pruning, thinning of the trees, apply pesticides and so on. If one has energy in the body one can think of new ideas and ways to work. I have apple orchards in two separate places. If there were children around things would have been different” [LS – Hotel Owner/Mukhiya/TMsC Chairman, Marpha].

Given this scenario, the tourism and conservation responsibilities rest mostly on the shoulders of elders. Houses and land left behind that requires attention have been fulfilled by immigrants coming from Upper Mustang, Baragaun or from neighbouring districts such as Myagdi, Rukum, Dolpo (NTNC, 2008). A hotel owner of Puthang said:

“If it had not been the people who in migrated from other districts such as Rolpa, Rukum, Baglung or Mayagdi, 50 percent of our farmland would have been left barren” [GA – Hotel Owner, Puthang].

These immigrants filled the vacuum created in the labour market, however many stakeholders feared that they may not necessarily understand or appreciate the culture and traditional values and practice of Mustang, and therefore be a big threat to their society. Some interviewees explained:

“In recent years there has been a trend of richer people leaving this place for better opportunities while less fortunate people from other parts of Nepal are moving in. Since they are an outsider they don’t have that much understanding for and appreciation of our culture, traditions and heritage. This increases the possibilities of our heritage being damaged and destroyed” [TS - Hotel Owner/ CAMC Secretary, Larjung].
The reasons why the stakeholders were worried about the safety of their culture and traditions is also be reflected in the response of an interviewee, who believes that the lower Mustang area is a kaleidoscope of different cultures, people and their way of living, including their diverse ritual practices and village settings. In this regard, some villages are more susceptible to the erosion of indigenous culture. Interviewees from Tukuche and Puthang expressed that villages such as Tukuche, Thini and Dhumba are filled with migrants who are there purely for economic reasons.

“......around Tukuche, there has been lots of in migration of people from Rukum and Rolpa during the state of emergency period. In Tukuche the original inhabitants are nearly 500 but the recently migrated people account for 1000” [TP - Restaurant Owner, Tukuche].

Fears have also been expressed about the increasing in-migration of non-natives and their impact on the forest resources. A survey on the road status found that villagers from Kobang and Lete found adverse impacts on forest resources (for firewood, timber) and over exploitation of non timber forest products (NTFPs) (Shah, 2007); the pressure is perceived to have been generated by in-migrants. Such incidences highlight the issue of loss of intimate human-environment relationships that not only ground and substantiate stakeholders’ worldviews, but also work to maintain and steward local landscapes (Carte & Nuttall, 2009).

Increase in land value has also been perceived as a major impact of the road. The land value of Puthang is now as expensive as that of Pokhara and Kathmandu, while that of Muktinath, Marpha, Tukuche, Kobang and Lete (NTNC, 2008; Shah, 2007) is also expensive. The once commonly practised traditional rule of not selling property to outsiders in Mustang is beginning to fade. In Muktinath, four properties have been sold to outsiders since the operation of the road.

Throughout the history of Mustang, the livelihood options and opportunities were carved out of a practice involving a great amount of migration, purely for economic reasons. Until the proliferation of tourism, people travelled south to Pokhara, Kathmandu and as far as India for trade during the winter. After the area became popular for tourism, migration to prospective tourism hub villages took place. Thus migration is not new, but what now complicates it, especially with the road development, is the heterogeneity of ethnicity, the scale of the economic operation and the intensity of tourism development.
5.2.1.3 Globalization of Local Economies

The people of lower Mustang have a mixed subsistence and cash economy with a combination of tourism, traditional crop farming, commercial vegetable and horticulture and livestock rearing. The growth in the vegetable farming and horticulture came mainly due to the demand from tourism. Similarly the ACAP’s strategy of retaining economic benefits within the community and linking tourism benefits with other livelihood options, encouraged hotel/lodge owners to promote the delicacies made from locally produced vegetables, fruits and crops. This was a win-win strategy for both the tourism service operators and farmers. Such strategies not only helped the community to diversify their livelihoods but also provided opportunities to value-add to products grown locally.

Some stakeholders made fortunes through the operation of the distillery that produced one of the country’s finest apple and apricot brandies, while others gained a good income through selling brandy, jam, jelly, cider, apples and farm produce. This prompted many farmers to abandon traditional crop farming and become involved in vegetable farming. An interviewee from Syang village mentioned:

“I have stopped growing crop since 15 years ago. Instead I grow vegetables which I sell at Puthang (airport area), where hoteliers and trekking agency staff come to buy. These vegetables go as far as Upper Mustang. This has helped to improve my living standard” [TAB – CAMC Chairman/Farmer, Marpha].

Until the road development, the local agricultural and horticultural produce was mainly consumed locally, especially by tourism service operators. However, the development of the road and quick connectivity to the nearest town and city centres such as Beni and Pokhara has intensified the integration of the local economy with the global economy, creating new opportunities for local farmers. The traders from the cities now travel to lower Mustang to purchase fruit and/or vegetables in bulk, as opposed to the time when village farmers had to sell them over an extended period (almost 6 months). Currently, apples are being transported to the cities the moment they are harvested. The road has opened new opportunities for local agricultural/horticulture produce to be mass exported to the cities.

Such a trade trend has left local markets with limited supply posing challenges in the operation of tourism business within the region. As told by the interviewees, the mass export
of such produce and the scarce supply yet excessive demand in local markets, have increased the market price of such produce to 5-6 times higher than before the road opened:

“Vegetable farming is doing good business because the seasonal vegetables are off season in the cities. The situation is such that now we fear we may not get the local vegetables to eat or it may be costly for us as they are being exported out of Mustang” [GA - Hotel Owner, Puthang].

“….if the local produce is not available in the village it will affect our business. For instance we use to buy apricots from the producer at Rs.10 per kilo, but now even if we pay Rs.50-60 it is not available in the market” [GS - Hotel/Retail Shop Owner, Puthang]

This has not only exposed the subsistence local economy to a more vulnerable and volatile cash-based global economy, but is also beginning to displace the traditional livelihood system by an input-intensive commercial agricultural and horticultural practices. The improved access to markets and the high demand of local vegetables and apples from outside have encouraged the majority of farmers to leave the traditional crop farming and switch to commercial agriculture and horticulture. But, as stated by Vedwan (2006), apple farming is a high-return/high risk livelihood system, engendering dependence on exogenous forces such as the markets. The risk of extensive reliance on such primary production is also generated by the fact that leafy vegetables and fruit trees require more water than the crops ecologically adapted to relatively dry conditions (Kvaloy & Sandvik, 1992). The sensitivity of apple orchards to unusual weather phenomena, pests and diseases, and cases of harvest failure in 2008 have been experienced in Kobang, Larjung and Tukuche villages.

In addition, the prospects of maximizing economic opportunities are pushing the area to the path of rapid investment and the development of new settlements. The alteration of the landscape as a result of the rapid pace of sprawl is also affecting the land cover of the area. There are now overwhelming interests among Thakalis (who once out migrated for various reasons) and many non-native individuals in buying property for building holiday homes and luxury resorts in the area. Demand for timber for housing construction has increased the pressures on the forests of Kobang, Tukuche and Lete. Land alteration for human use is regarded as the single most important component of global environmental change affecting the ecosystem because of habitat change and loss (Hall & Lew, 2009).
As Frandenberg, (2005) stated, in areas where rapid developments occur, ‘social tension’ and ‘property and land values’ which were previously seen as ‘externalities’ could become long term ‘internalities’. This is because, in nature tourism, tourist attractions must be consumed on site since the product offered by nature tourism is the natural site; ecologically insensitive developments (Frandenberg, 2005) pose as the greatest threats to the NBT system. Therefore, as Hall & Lew (2009) suggested, the fundamental issue in terms of sustainability of the destination area (such as lower Mustang), is not so much change per se, but the magnitude of change in relation to the system’s capacity to adapt and develop without the loss of the natural and cultural resources that form the important basis of the NBT supply system.

5.2.2 Vulnerability Due to Political Instability

The stakeholders’ discourse on the threat to tourism also pivots on a political issue and its impact on their livelihood and governance. A great majority of stakeholders expressed the view that although lower Mustang remained relatively unaffected during the decade-long civil war (as opposed to the southern area of ACA), the conflict and the negative media publicity have tarnished Nepal’s image as a safe and secure destination and affect tourists’ mobility in the area. Although peace has been restored in the country, the stakeholders pointed out that the new emerging local political issues as well as the transitional period of the country, are affecting tourism. Interviewees from Larjung and Lete explained:

“3 years before people talked a lot about their hotel business being affected by the Maoist movement. Many tourists who stayed in our hotel told that many others would have visited Nepal, had it not been for the Maoist insurgency. It seemed that there has been lots of bad publicity of Nepal through the media and internet. [……] and now even though the Maoist problem is solved, the political situation is still volatile. Take today’s example, it seems there is some ‘bandh’ (shut down of the district) here called by the Maoist party. It is so hard to understand what’s happening these days” [TR – Hotel Owner, Larjung].

“Since we are in a transition state most of our activities are disrupted, therefore no one can say what exactly the future of tourism will be” [TP – Retail Shop Owner/CAMC Chairman, Lete].
A comparison of tourist arrivals in Nepal and lower Mustang during and after the conflict in Nepal, shows a strong correlation between tourist arrivals and political events (before and after the armed conflict period) (see Table 5.3). Worse hit were the years after 2001, when the influx of tourists in lower Mustang decreased steadily with the lowest figure ever recorded at 14867 in 2002. Noteworthy is that 2002 was also the year with the lowest figure of 275468 ever recorded for Nepal. During this year, both Nepal and lower Mustang suffered negative growth of 24 percent and 28 percent. Similarly, the unilateral withdrawal of the cease-fire by the Maoist party in 2003 saw positive signs of growth in tourist number. However, in 2004 intensification of the donation collection process by the Maoist along the ACT route kept many tourists away from the lower Mustang area. So despite positive growth in the overall tourists’ arrival in Nepal, lower Mustang suffered a loss of 15 percent in this year.

“In 2004, the situation in most areas outside the Kathmandu Valley remained tense and uncertain. Rebel armed attacks, landmine explosions and vehicle burnings occurred sporadically on main highways, including the roads linking Kathmandu [...] with the tourist destinations such as Pokhara, Annapurna Conservation Area, and Chitwan National Park” [Nepal Insurgency, 2004].

The events such as the dissolution of parliament, the curbing of the free media followed by the cutting of the telephone lines and internet during 2005 affected tourists’ arrival of 2006, both in Nepal and lower Mustang.
Table 5.3: Tourist arrivals in Nepal and lower Mustang during and after conflict periods

<table>
<thead>
<tr>
<th>Political Events</th>
<th>Year</th>
<th>Nepal No of Tourists</th>
<th>% Change</th>
<th>Lower Mustang No of Tourists</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Royal Massacre, State of Emergency</td>
<td>2001</td>
<td>361237</td>
<td></td>
<td>20815</td>
<td></td>
</tr>
<tr>
<td>State of Emergency, Royal Take Over</td>
<td>2002</td>
<td>275468</td>
<td>-24</td>
<td>14867</td>
<td>-28</td>
</tr>
<tr>
<td>withdraw ceasefire</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State of Emergency</td>
<td>2004</td>
<td>385297</td>
<td>14</td>
<td>15013</td>
<td>-15</td>
</tr>
<tr>
<td>Dissolving of the Parliament, curbing of the free media, cutting of the telephone</td>
<td>2005</td>
<td>423789</td>
<td>10</td>
<td>19121</td>
<td>27</td>
</tr>
<tr>
<td>lines and internet, ceasefire</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peace Treaty Signed - power-sharing pact between the Seven Party Alliance (SPA)</td>
<td>2006</td>
<td>383926</td>
<td>-10</td>
<td>16356</td>
<td>-14</td>
</tr>
<tr>
<td>and the Maoist</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post Insurgency: Transition, Peace Building and Restructuring of the country</td>
<td>2007</td>
<td>526705</td>
<td>37</td>
<td>23226</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>2008</td>
<td></td>
<td></td>
<td>27796</td>
<td>20</td>
</tr>
</tbody>
</table>

The 12-year armed conflict ended on 22 November 2006 with a power-sharing pact between the Seven Party Alliance (SPA) and the Maoists (Limbu, 2008). This had a positive effect in the form of increased tourist arrivals over the following years. In fact, 2007 recorded a historic record total of over half a million tourists. Similar signs of positive growth have also been recorded for lower Mustang in 2007 and 2008.

However, the existing transition period and a series of nationwide strikes demanding secular states, rights to self determination for indigenous people as well as political, social and cultural rights (Limbu, 2008), continue to make tourism destinations, such as lower Mustang, vulnerable. The repeated incidence of “Bandha” in Kathmandu and Terai, the two most important strategic entry points for tourists, have made them susceptible to such events and increased sensitivity. In stating the grave concern over the prospects of tourism in the event of ongoing political instability, an interviewee from Puthang explained:

“If it (political situation) continues like this then tourist numbers will be drastically decreased. Long before they come here they will have to fly into Kathmandu and if they are coming by road from India, they will have to come through Terai. Therefore unless the political situation improves it’s hard to say if the tourism will continue to grow” [ GA - Hotel owner, Puthang].
The ongoing political strife and deteriorating situation have been important factors affecting administrative, regulatory and the risk governance aspects of tourism in lower Mustang. For the first time in the history of Mustang, a district-wide shut down was observed there while this study was being conducted in Jomsom.

Destination image is an important aspect for the successful operation of tourism services. Nepal’s tourism industry during the conflict experienced severe loss because of the negative and exaggerated press coverage about the law and order situation of the country by the Indian press (Adhikari, 2005) and travel advisories issued by western governments (Thapa, 2003), thereby escalating the crisis in tourism in Nepal. There is strong correlation between a positive perception of a destination and a positive purchase decision (Pearce, 1992, as cited in Adhikari, 2005), indicating destination image is a key factor in tourists’ buying behaviour. The overwhelming increase in the tourist arrivals following the signing of the peace treaty in 2006 provides strong evidence that tourism potential can be realized only in a peaceful and stable condition.

5.2.2.1 Risk Governance Capacity

The framing of the vulnerability contexts based on governance capacity is nowhere so apparent and complex than in the tourism supply operation in lower Mustang. NBT in lower Mustang has a unique history in terms of its system of governance. As shown in section 3.5.5, there are numerous tourism stakeholders with distinct jurisdiction, roles and responsibilities mutually supporting and relying on one another to manage tourism. The governance based on a participatory management approach adopted by these stakeholders has brought huge success in the management of NBT and has also proven that such an approach can assist not only in livelihood improvement, but also in conserving the environment and preserving the culture. Therefore some lessons learnt from the success of tourism management in lower Mustang or ACA, are recognition that meaningful participation is a must for successful resource conservation, the grassroots philosophy and emphasis on local stakeholders playing a central role in identifying, implementing and managing tourism. From the governance perspective, such an initiative was the move to encourage the decentralization of the power and responsibility that has also been reflected in the government structure. The introduction of the Local Self Governance Act (1999) and the distribution of power at the DDC and VDC level are examples of such initiatives.
In the context that Nepal is going through a downward spiral of state instability, political factionalism, weaker governance and leadership, the effect of this problem is also reflected in the overall governance context at the micro level such as in lower Mustang. The lack of government representatives, the politically radicalized community and the dissolution of elected bodies have resulted in a power vacuum in lower Mustang. This, in turn, has weakened the authority, rule of the law, justice (social, economic and environmental) and the capability for delivering basic services. For instance, local institutions responsible for the effective management of tourism have been subjected to the impact of the ongoing volatile political situation thereby inhibiting their capacity to regulate and manage the tourism development process within lower Mustang. Leaving aside one or two TMsCs and MGs, institutions are not as active as they were before. Communities are making decisions that suit their personal interests. The CAMCs’ roles are challenged by the increasing trends in natural resource exploitation (e.g. excessive foraging for Yarsagumba, cutting down of trees for timber production), or the haphazard construction of agricultural roads in places planned for alternative ACT routes. The changing attitude of locals is seen as an important factor affecting the governance of the forest resources and tourism in the area.

5.3 Chapter Summary

The aim of this chapter was to explore stakeholders’ perceptions on vulnerability due to the social dimension of change, in the face of climate change in lower Mustang. Before the examination of the social dimension of change, the exploration of the socio-economic status and the livelihood patterns of the tourism stakeholders have been carried out as a basis for understanding the tourism stakeholders’ background and their livelihoods against which they operate the NBT supply system. It is evident that stakeholders are multi-entrepreneurs, operating diverse livelihood activities dictated by a flexible seasonal calendar.

The chapter showed that the system is exposed to two key dimensions of threats, namely socio-economic/land use and political change. From the socio-economic/land use change perspective, road development, migration and globalization of the local economy are some of the key drivers of change affecting the dynamics of the NBT supply system.

From the social change perspective, it is evident that tourism stakeholders are at a crossroad. The stakeholders have been exposed to the structural changes in the NBT resulting from the
government decision of constructing Beni-Jomsom-Korolla Road. Road development and therefore the changing tourism dynamics, especially the transformation of the niche-based NBT activities e.g., trekking and mountaineering, to diverse activities such as domestic, religious tourism and leisure activities have resulted in mixed impacts. It has provided opportunities to some stakeholders, but there are also many who have been negatively affected while great many have been displaced.

The growth performance of domestic and Indian tourists shows that domestic and religious tourism will be the most significant forms of tourism in future. Similarly, the availability of surface transport highlights the fact that future tourists are going to be very mobile with several short treks, pilgrimages, and weekend travel instead of long treks. This new phenomenon is likely to change both temporal and geographical aspects of NBT, removing the barriers of climate seasonality and inaccessibility. Although these new developments show positive outlook and promises for growth in tourism, these changes are also likely to have long-term negative implications in tourism supply production and management. The findings show that issues related to social and environmental carrying capacities (e.g. congestion, traffic management, in-migration, water and forest usage, local land use planning, and waste management) are some of the key threats to which the stakeholders are now exposed.

Findings also show that the migration phenomenon is an important threat for sustainable NBT management. Although migration is not new, the fact that excessive out migration of local youth and in migration of people from outer districts is perceived as a threat factor in maintaining the economic sovereignty and socio-cultural integrity while sustaining tourism development in the area.

Globalization of the local economy due to access to a new market base has exposed stakeholders and the subsistence local economy to a more competitive, volatile and cash-based economy. Similarly, it has also resulted in switching the traditional crop farming to more intensive horticultural and commercial agriculture practices, which require more water than the former crops.

The findings show that the unique NBT characteristics of lower Mustang and the effective system of governance (participatory management), which have been important in the NBT supply production, have now been affected by ongoing political instability. Therefore,
political instability has been perceived as a crucial threat factor affecting tourism in lower Mustang. The overwhelming growth of tourists after the signing of the peace treaty indicates that, besides other factors, tourism growth is inherently linked to the safety and security situation. However, due to the political process involved in the production of the NBT supply, the prevailing volatile political situation has affected the governance system, perpetuating the vulnerability of tourism and its stakeholders.

The weakening governance capacity of the stakeholders within lower Mustang provides important evidence of how sensitive the NBT supply system is to political instability. In the context of rapid socio-economic transformation, and a society where the governance issues are impacted by the ongoing political instability, human induced environmental change, especially climate change, is going to be a major threat for the sustainable management of NBT in lower Mustang. Climate change is a threat multiplier, with its capacity to magnify and exacerbate existing social, economic, political, and environmental problems and challenges (Carte & Nuttall, 2009), including those currently faced by the NBT system and its stakeholders of lower Mustang. The next chapter explores the stakeholders’ perceptions about the vulnerability of the NBT system to climate change in order to understand the grassroots perspectives and the actual vulnerability.
Chapter 6
Perceived Vulnerability of NBT System to Climate Change

6.1 Introduction

This chapter investigates tourism stakeholders’ perceptions about the vulnerability of the NBT system to climate change. The aims of this chapter are to:

- explore the stakeholders’ understanding of climate change. Understanding in this context broadly looks at the tourism stakeholders’ awareness and knowledge of climate change;
- explore the perceived exposure to, and the associated impacts of climate change on the NBT system; and
- appraise tourism stakeholders’ perception about adaptation to climate change impacts, including the two key aspects, namely, the stakeholders’ response to climate change impact adaptation and their adaptive capacity.

6.2 Tourism Stakeholders’ Understanding of Climate Change

Stakeholders have varied understanding about what climate change is, how and why climate is changing, and what impacts it has on tourism and their livelihoods.

Most tourism stakeholders said that they have heard about climate change, especially through the media such as radio, television, newspapers and public gatherings and local events. Of those who claimed to have heard from media, many said that the change in greenhouse gas (GHG) emissions, warming of the earth and melting of the glaciers resulted from climate change. One of those interviewees said:

“Oh it must be due to the change in environment. There has been a talk of earth warming, melting of the glaciers and the snows in the mountains. Now-a-days many people talk about it in the television, news and so on. They are talking about bursting of glacial lakes and rise in the sea level” [LS – Retail shop Owner, Marpha].

However, it is also important to note that the data collection period coincided with several important events such as the celebration of the Conservation Day of ACAP and World
Environment Day – 2009 (WTD-2009). The WTD-2009 event was dedicated to climate change with its slogan, "Your Planet Needs You - UNite to Combat Climate Change", which was organized in several villages (such as Lete, Puthang and Kobang) (see Plates 6.1, 6.2 and 6.3). The year 2008-2009 was also significant from the perspective of witnessing some most unusual climate events. The dry winter season of 2008, with no snowfall, the prolonged drought 2009, increased incidence of the forest fires; and hailstorms for the first time in villages such as Marpha and Tukuche, played an important role in shaping stakeholders’ awareness about the climate change.

Plate 6.1: Event organized during the World Environment Day, 2009 and ACAP’s Conservation Day at Lete

Plate 6.2: Women gathered at the Event

Plate 6.3: Children watching the event from the rooftop of the community building

Most stakeholders therefore understood the term climate change as the change in weather (e.g., no snowfall, unusual weather phenomenon, increasing temperature) and increased
frequency of natural disasters. They explained that these perceptions were based on their daily life experience. This shows that the stakeholders’ understanding about the causes of climate change, as discussed in section 2.6.1, are influenced by their common sense perceptions, derived and reinforced by their everyday sensory observations and the local memory of the climatic events. Many also believed that deforestation, pollution (mainly due to vehicles) and waste accumulation (due to population growth and sprawl) are reasons behind climate change. As far as deforestation is concerned, the importance of forests is expressed mainly from the point of view of reviving a large area devastated by forest fires (in places such as Sauru, Tukuche and Thini) or felled excessively in recent years, or purifying the surrounding environment and air rather than its role as a carbon sink. These findings are consistent with research by Kempton (1991) and Seacrest et al., (2000), who found the wider public stating deforestation and air pollution as the causes of climate change. These findings show that stakeholders’ understanding of climate change is varied, and draws on broader discourses rather than scientific knowledge.

Women stakeholders’ perspectives in understanding climate change, in general, are more influenced by cultural values and belief. Their explanations for changing climate hinge upon strong cultural belief such as the wrath of God. One interviewee from Puthang said:

“These days many people go in the high mountain pastureland to collect Cordyceps sinensis. These collectors are eating traditionally forbidden ingredients such as garlic near the mountains; this may have angered the God” [SMK – Hotel Owner/Mothers Group Chairman, Puthang].

Another interviewee from Marpha said that garlic and onion, culturally, were impure ingredients and people in olden days believed that growing them on the farm would anger the God, and therefore would spell the disaster in the village. These findings are consistent with the literature on values and beliefs reviewed in section 2.6.4.

In general, women, people with no formal education and in the lower income group, were stakeholders who said they knew nothing or very little about climate change. Of those who were ignorant about the issue, they were either confused by the terminology ‘Jalbayu Parivartan’ (lit. climate change in Nepali language) or had not heard of it at all. The Nepalese terminology ‘Jalbayu Parivartan’, if literally translated, means changes in water and air. As a
result, some stakeholders explained changes in air and or rainfall (or even sea level rise) as climate change and that it was caused by air pollution.

Seacrest et al., (2000) stated that the wider perceptions (e.g., deforestation, pollution, etc.) to indicate that the majority of the public did not understand the fundamental physical mechanisms underlying climate change, implying that there are misconceptions regarding public understanding about climate change. Such a statement may be true of the public in the developed world with open access to information and technology where people’s livelihood is not directly linked to the environment. Therefore, although stakeholders’ understanding of climate change may imply misconception, it is in fact the consequence of lack of access to information, confusing Nepalese terminology (‘Jalbayu Parivartan’) for, and the holistic understanding of the climate change. Such holistic understanding is a reflection of their inherent historical relationship with the environment (e.g., livelihood dictated by the seasonal calendar or crop-climate relationships). The impact resulting from exposure to and impacts of climate change to different assets of the NBT system (discussed in section 6.3) also illustrates the reason for their holistic understanding about climate change.

It is, however, important to note that the lack of understanding of the fundamental physical processes contributing to climate change could constitute an important constraint for the stakeholders to comprehend the relationship and the sensitivity of the impacts of climate change on tourism, or make informed decisions to cope with or adapt to its impact. The following sections will focus on that.

6.3 Perceived Exposure to and Impacts of Climate Change

There is a consensus among tourism stakeholders that climate changes have been observed and impacts experienced. Figure 6.1 shows the impact pathways framework developed to understand the exposure to and the impacts of climate change perceived by stakeholders.

As the figure shows, the impact pathways comprise the perceived exposure and impact element affecting the NBT system. Although the figure is not exhaustive, it serves as an important framework to assess the impact pathways systematically. As is apparent from the figure, the impacts are far-reaching and it is difficult and beyond the scope of this thesis to provide a complete description. The complex nature of the impact pathways is the result of
the myriad of interactions between and within the exposure and impact elements, against the backdrop of other stress factors discussed in Chapter 5.

Figure 6.1: Impact pathways of climate change to NBT system based on tourism stakeholders’ perspectives

From the stakeholders’ perspective, the NBT system of lower Mustang is exposed to four key climatic conditions. These are the warmer winters, cold, wet and unsettled spring, intense and erratic summer monsoon and seasonal anomalies.

6.3.1 Warmer Winters

Warmer winters have been the most widespread climatic change perceived by the tourism stakeholders of lower Mustang. The stakeholders’ general perception is that it has become warm in winter, as well as dry. As one interviewee stated:

“In earlier days winter used to be very cold while summer, just warm. But now a days the place has become very warm in winter” [SMK – Hotel Owner/Mothers Group Chairman, Puthang].
Three decade temperature data for winter in Jomsom (the district headquarters of Mustang) showed a more or less constant trend in the maximum temperature for the months of December and January but February showed a gradual decreasing trend. Since 1981, there is a significant decreasing trend in the minimum temperature for December and January, with a fluctuating decreasing trend for February (see Figures 6.2 and 6.3).

Figure 6.2: Three decade maximum winter temperatures of Jomsom
Figure 6.3: Three decade minimum winter temperatures of Jomsom
(Source: Department of Hydrology and Meteorology, 2009)

This significant decrease in the minimum winter temperature may have influenced interviewees’ perception about the place becoming warm. A study done by Rebetez (2000) on climate variability on two century long daily minimum and maximum temperature from Switzerland, found that warmer temperature during the 20th Century have been accompanied by reducing day-to-day minimum temperature for winter. Rebetez also suggested that climate variability is important for the people perception of place becoming warm or cold.

The literature review in section 2.3 also found warming to be more pronounced in the high altitude regions of Nepal. It may be inferred that the impacts of warm winters have resulted in the change in snowfall patterns, melting of the snow cover and glaciers and increased evaporation. A study by Walther et al., (2002) showed that lengthening of the freeze-free periods in most mid and high latitude regions were a result of a warming trend and also an increase in minimum temperature (about twice the rate of maximum temperature). Since the sensitivity of the mountain glaciers to the temperature is very high, the melting of the snow cover and glaciers provides the clearest evidence of atmospheric warming (Beniston (2003).

Several stakeholders gave an account of recent changes in the quantity, timing and patterns of snowfall, while others told of having experienced some weather extremes. Remembering experiences of abrupt heavy snowfall, a hotel owner from Ghasa explained:
“Two years back there was a massive snowfall in this area. In fact that year the snow fell in Kathmandu too” [GV – Hotel Owner, Ghasa].

The snow that fell in 2006 was what some stakeholders remembered previously used to occur (see Plates 6.4 and 6.5). Since 2006, it has decreased dramatically and, in 2008, it did not snow at all.

From the stakeholders’ perspective, the decrease in snowfall resulted in both positive and negative impacts. The positive impact is that winter is no longer a barrier for trekking tourism in lower Mustang (discussed in detail in section 6.3.4). 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 that the stakeholders fear would lose the natural and aesthetic beauty of the mountains. A hotel owner from Kalopani stated:

“Tourists come to see the snowy mountains, if we do not have snow in our mountain, no one will come to see the bare mountains” [GL – Hotel Owner, Kalopani].

### 6.3.1.1 Reduced Water Availability

Reduced water availability due to decreased snowfall, melting of the snow and glaciers and increased evaporation is beginning to affect all three key assets of NBT. 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 that is further away. The new source in Puthang is on a hill 6-7 km away from the village. Similar stories were told by the stakeholders of Marpha.

“Since 10-15 years the source of water has been decreasing gradually. Before we used to bring water from Jhong but now-a-days there is not much water so we brought the water from Yak Kharka which is further away than Jhong” [LS – Hotel Owner/Mukhiya/TMsC Chairman, Marpha].

Camping activity in the high mountain valleys (e.g., Upper Mustang) has also been affected by reduced water availability. Sharing this experience, a guide who took clients trekking in Upper Mustang explained:

“When we were trekking in Yara and Ghara (villages in Upper Mustang) we had a major difficulty of finding a suitable camping place due to a shortage of water source. Due to less snowfall the ice melted very fast leaving less water discharge at source during trekking season” [NH – Trekking Guide, Lete].

The dry winters have also dried many tributaries that feed the Kali Gandaki River and other water bodies (such as lakes). An interviewee from Kagbeni expressed his concern over this situation:

“I sometimes fear that this place might turn into desert. Lack of snows in the mountains has dried many tributaries that feed the Kali Gandaki River. Water of the rivulets in places such as Dhakarzhong and Tiri has declined sharply” [GPB - Hotel Owner/ CAMC Chairman, Kagbeni].

The scarcity of water in some villages (Muktinath, Kagbeni, Puthang, Marpha and Lete-Kalopani) is also due to other stresses such as the increasing demand from the increasing number of hotels and settlements, seasonal disruption of the water distribution due to its susceptibility to events such as change in snowfall, rainfall or the infrastructure washed away by landslides.
Because of the water scarcity and security threat, the World Bank has identified the Himalayan region as a climate change hotspot (Strategic Foresight Group, 2009). Climate change induced water stress may have serious implications in lower Mustang where water availability is already constrained by its natural setting (semi arid conditions and limited water bodies) and increasing demand. This will further increase the livelihood hardships of tourism stakeholders in a number of ways. First, it acts as a barrier for them to actively take part in tourism service. As stated by Gössling & Hall (2006), tourists’ consumption of fresh water supplies in areas where such resources are scarce further competes with the needs of other livelihood practices such as farming and other household water usage, and thus increases the inter community conflict. Conflicts in water stressed areas such as Phalyak (Dahal, personal conversation) and competition for water for irrigating farmland in Marpha have recently been experienced by the stakeholders. Part of the problem is the traditional irrigation system, which is not adequately reliable.

Drought is perceived to have resulted in an increased incidence of forest fires in the area. As told by the stakeholders, there have been repeated cases of forest fires in the forest of Ghasa (2008 and 2009), Sauru (2007, 2008 and 2009) (see Plate 6.6) and Tukuche (2008). On June 20, 2009, while I was collecting data, another massive forest fire occurred in the forest above Thini village (see Plate 6.7).

The winter drought of 2008-2009 has been declared as one of the worst in the history of Nepal (World Food Programme, 2009). Much of Nepal received very little or no rainfall between
November and March 2008 when westerlies are supposed to bring rain or, at high elevations, snowfall (NCVST, 2009). Several incidences of forest fires became usual daily features in different parts of Nepal, more commonly in the high mountain regions. The NASA’s Aqua satellite caught a glimpse of relatively rare large-scale forest fires in the renowned mountain protected areas such as the Annapurna and Kanchanjunga Conservation Areas, Langtang and Makalu Barun national parks (Khadka, 2009) (see Figure 6.4).

Figure 6.4: NASA’s Aqua satellite map showing a glimpse of large scale forest fires in the Himalayas of Nepal.

(Note: Places where the sensor detected active fires are outlined in red. Annapurna region is marked by the yellow circle)

6.3.2 Cold, Wet and Unsettled Spring

There is also a general agreement among stakeholders that spring has become cold, wet and unsettled. As per the established seasonal calendar, spring is a calm, warm and pleasant season. However, it is now becoming wet, unsettled, and windy, accompanied by snowstorms, hail and rainstorms. Explaining this situation, an interviewee said:

“Our winter (December – February) months are becoming warmer while we are wearing the thermals in the spring season” [TK – Hotel Owner/Mukhiya, Puthang].
Changes in temperature and weather experienced during winter and spring by the stakeholders is consistent with the research conducted by Shrestha et al., (1999) which showed the greatest rate of temperature increase in the winter and lowest in spring. The impacts of such changes are felt in farming and horticulture especially hail and rainstorms. As shown in Figure 6.1, the combined impact of warmer winters and cold springs in the form of a seasonality shift is affecting tourism, human and natural assets that will be discussed in section 6.3.4.

6.3.3 Intense and Erratic Summer Monsoon

Stakeholders from southern lower Mustang such as Kobang and Lete VDCs have the general perception of their area experiencing an increased and intense summer monsoon. In Jomsom, the annual average rainfall data for the five year period 1981-1985, is 295 mm whereas in the southern area such as Lete, it is 1227 mm (Kvaloy & Sandvik, 1992). Within lower Mustang there is therefore an impressive gradient from south to north, with south receiving four times more precipitation than the north (see Figure 6.5).

![Precipitation transect for Mustang](image)

(Source: Department of Hydrology and Meteorology, 2009; Kvaloy & Sandvik, 1992; Lama, 2006; NTNC, 2008)

**Figure 6.5: Precipitation transect for lower Mustang**

The three-decade precipitation record of Mustang shows that rainfall has increased in the southern lower Mustang such as Lete. The intense and increased summer monsoon in the southern area has also recently increased the incidence of floods and landslides particularly in Kobang VDC. Stakeholders of the Kobabng VDC expressed their concern regarding the increased flow of the Kali Gandaki River during the summer monsoon and the repeated
incidence of floods and landslides in villages such as Larjung, Sauru and Sirkung. Such events have destroyed tourism infrastructure such as hotels, bridges and trekking routes; and affected the continued operation of the service/business. The levels of damage sustained are varied in nature and scale. Those hotel owners whose property was severely damaged the flood said:

“Our village was badly affected by the flood of 2002. It washed away four houses, damaged several hotels such as the Riverside Lodge, Larjung Lodge and my own. There was no human casualty, but it was a very destructive flood that damaged the property and the trekking routes” [TS – Hotel Owner/CAMC Secretary, Larjung].

“The flood has affected my property as well as the business. For 2-3 years I did not operate the hotel during the monsoon season for 2-3 months, fearing that the disaster of such scale might happen again. We did not want the reputation of the hotel to be tarnished” [TB – Hotel Owner, Larjung].

Similarly, the fragile geological conditions, steep topography and the force of the Kali Gandaki River have resulted in several disasters in the past, indicating a potential danger the existing infrastructures/facilities face. Upreti and Yoshida (2005) suggested that several terraces and floodplains developed by the Kali Gandaki River indicate that it must have been blocked several times at different location by landslides and glaciers in the geological past\textsuperscript{7}. These conditions play an important role in the occurrence of natural disasters and the inherent vulnerability in the area, which could become the biggest safety and mobility issue for the stakeholders\textsuperscript{8}. Table 6.1 shows the general vulnerability driven by the natural disasters, as experienced by the stakeholders.

\begin{itemize}
\item \textsuperscript{7} The disaster that led to the blocking of the Kali Gandaki River was the flood that occurred 22 years ago in Tatopani area (a tourist’s hotspot area just below the Ghasa village), which submerged the entire village, damaged all the property including the only trail and bridge that linked Mustang with the cities.
\item \textsuperscript{8} The recent events of torrential rain and flood that wiped away most of the Inca Trail of Maccha Picchu in Peru, and Madeira – the holiday island of Portugal – is a grim reminder of how natural disaster can become the biggest safety and mobility issue for both tourists and local communities.
\end{itemize}
Table 6.1: Perceived experience of natural disaster related events in lower Mustang.

<table>
<thead>
<tr>
<th>Natural Hazard Types</th>
<th>Climate Related Variables</th>
<th>VDC</th>
<th>Affected Villages</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Floods</strong></td>
<td>Intense Rainfall</td>
<td>Marpha</td>
<td>Marpha</td>
<td>1998 and 2006</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tukuche</td>
<td>Chokhopani</td>
<td>2007</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lele</td>
<td>Ghasa</td>
<td>1972</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Tatopani</td>
<td>1987</td>
</tr>
<tr>
<td><strong>Landslides</strong></td>
<td>Intense Rainfall</td>
<td>Kobang</td>
<td>Sauru and Sirkung</td>
<td>2007, 2004</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tukuche</td>
<td>Chokhopani</td>
<td>2007</td>
</tr>
<tr>
<td><strong>Hailstorms</strong></td>
<td>Intense rainfall with hails</td>
<td>Marpha</td>
<td>Marpha</td>
<td>2009 (first time ever)</td>
</tr>
<tr>
<td></td>
<td>Extreme cold weather</td>
<td>Tukuche</td>
<td>Tukuche</td>
<td>2009 (first time ever)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kobang</td>
<td>Larjung</td>
<td>Frequent event</td>
</tr>
<tr>
<td><strong>Windstorm</strong></td>
<td>Strong winds</td>
<td>Marpha</td>
<td>Puthang</td>
<td>Frequent events</td>
</tr>
<tr>
<td><strong>Drought</strong></td>
<td>Increased Temperature</td>
<td>Marpha</td>
<td>Throughout Lower Mustang</td>
<td>2009</td>
</tr>
<tr>
<td></td>
<td>Increased Evaporation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strong Winds</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Less Rainfall</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Forest fire</strong></td>
<td>Increased Temperature</td>
<td>Lete</td>
<td>Ghasa</td>
<td>2008 and 2009</td>
</tr>
<tr>
<td></td>
<td>Increased Evaporation</td>
<td>Tukuche</td>
<td>Tukuche</td>
<td>2008</td>
</tr>
<tr>
<td></td>
<td>Strong Winds</td>
<td>Kobang</td>
<td>Sauru</td>
<td>2007, 2008 and 2009</td>
</tr>
<tr>
<td></td>
<td>Less Rainfall</td>
<td>Jomsom</td>
<td>Thini</td>
<td>2009</td>
</tr>
</tbody>
</table>

From the table it is also apparent that the vulnerability to the natural disasters is widespread and more common in all the villages below Jomsom. The vulnerability to floods and landslides also intensifies given that some of the villages (e.g., Khanti, Kobang and Larjung) are literally on the banks of the Kali Gandaki River, which further heightens the risk (see Plate 6.8). There is a lack of empirical research and relevant data related to extreme climatic events in the lower Mustang region, meaning the results are only indicative.
Plate 6.8: Overlooking the villages of Larjung, Kobang and Khanti and the Lhankyu River that caused a catastrophic flood in 2002.

Although it cannot be asserted with scientific certainty that any of these disasters were directly caused by climate change, they do show what can happen if climate change increases the frequency and intensity of climate-related hazards and are, thus, a valuable source of learning (NCVST, 2009).

The increased and intense summer monsoon is also perceived to have damaged traditionally designed and built structures. Traditional villages such as Tukuche, Marpha, and Jomsom, are known for their unique mud walled houses with a flat mud roof, which have experienced leaks and had walls torn down by the intense precipitation. Sharing this view an interviewee from Puthang explained:

“If you look at the houses of this place, it is all made up of mud, no cement and concrete, just purely mud. 10 years ago it rained crazily. This coupled with the continuous windstorms created big holes on the walls of all the houses in Puthang area” [TK – Hotel Owner/Mukhiya, Puthang].
This led the community to opt for building concrete buildings with tin roof (CGI sheet) that is beginning to change the traditional appearance of the village (see Plates 6.9 and 6.10).

The erratic nature of the summer monsoon also resulted in an intense pre-summer monsoon and hailstorms discussed in the following section.

6.3.4 Seasonal Anomalies

Seasonality is an important dimension of climate change impact in the destination area, with significant consequences (Koenig-Lewis & Bischoff, 2005; Amelung, Nicholls & Viner, 2007) in the NBT supply system. From the tourism assets perspective, the seasonality shift has affected activities such as trekking, bird watching and Rhododendron Flower Bloom touring. Figure 6.6 elicits the perceived general overview of this shift in NBT seasonality.
Traditionally, tourism activities in Mustang (such as trekking, mountaineering and bird watching) show two distinct seasons: the spring (March – May) and autumn (September – November). Being a mountain environment, the winter poses a natural constraint for the continuity of trekking between the spring and autumn. However, winter warming has extended the season beyond the established autumn (September through May). An interviewee explained:

“Earlier December to February used to be the off-season due to heavy snowfall. But now-a-days the entire winter season December through February is dry, so our tourism season has expanded from September till February” [TPB – Hotel Owner/CAMC Chairman, Tukuche].

Although the seasonal extension increased the trekking tourism season and tourist visitation, there are important points to consider. First, will such short term benefit translate into a long-term one? Second, what will the effects of climate-induced environmental change in the area be, given the condition of visible impacts in some key resources such as mountains, water, forests, farming, traditional designs and the building materials? These are the resource bases that determine the attractiveness of lower Mustang. Higher levels of visitation brought about by extended warmer winter (demographic changes in tourism market) will have several implications (Scott & Jones, 2006) for NBT, but the indirect impacts of change upon the
biophysical (snow cover, hydrology, biodiversity) (Nyaupane & Chhetri, 2009) are likely to be mostly negative.

Bird watching in spring is also an activity for special interest group tourists in lower Mustang. The Kali Gandaki River valley is an important corridor for both floral and faunal diversity and Ghasa is an important hotspot for bird watching, especially for viewing six different pheasants (including Cheer pheasant). During data collection in the Lete-Ghasa area I was informed that sighting Cheer pheasants as well as hearing its call had been very difficult, despite conducting the studies during the season (June) known for sightings and recommended in several research reports (P. Subedi, personal communication, June 15, 2009). The researcher mentioned several factors that may have influenced the lack of sightings. Of special interest to this study is the account of a local herder who suggested that the study’s timing was too late.

The seasonal shift has also affected the blooming of rhododendrons in the Lete area, as interviewees explained:

“I used to take groups to Manaslu trek before, and people there told me that the rhododendron flowers bloomed before the trekking season. We also have lots of rhododendron in our forests and it blooms in Chaitra-Baisakh (March-May) months. I found that the flowers here also bloomed earlier than it is supposed to” [GL – Hotel Owner, Kalopani].

Although there is no detailed empirical study on climate change and its impact on the phenology of floral and faunal species in lower Mustang, the interviewees’ claim is grounded on several studies of the response of the vegetations and terrestrial species to warming across the Northern Hemisphere (Scott, Wall, & McBoyle, 2005). These found that climate change is affecting birds worldwide in their behaviour, egg-laying and breeding habits (Bird Life International, 2009), earlier arrival of migrant birds and flowering of plants (Walther, et al., 2002) and onset of spring (IPCC, 2007a).

Stakeholders have also expressed concern over the potential dilemma among hotel and trek operators in disseminating correct information simply because of the contradiction between real seasonal performance and the one that is being promoted as. Sharing this view an interviewee explained:
“It looks apparent that the trekking companies may have hard time in relying on the established seasonal information and schedules. For instance in the forests of Lete, the rhododendron flowers bloomed earlier than the spring season” [NH – Trekking Guide, Lete].

In countries such as Japan and Canada, where flower bloom viewing tourism constitutes a major share of the industry (multi-million dollar), governments are adapting to the changes in the phenology of plants such as cherries (Japan) and tulipa (Canada) by commissioning scientists to programme the plants to bloom at the appropriate time (Simpson et al., 2008).

The perceived impacts on human assets from the seasonality shift are mainly through changes in the monsoon cycle and snowfall pattern and warming. An interviewee from Tukuche explained this situation:

“Rainfall pattern is just the opposite, while this year monsoon started from Jestha (May-June) instead of Asar and Shrawan (June-July and July –August), the standard monsoon season. It rained heavily in Jestha (May-June) and even in Chaitra (March). In fact on 26 Chaitra (25 of March), there was hailstorms, the most unusual weather experienced in our lifetime. After this day we experienced continuous frosts (sheet lahar)” [TIB – Retail Shop Owner/Mir Mukhiya, Tukuche].

The timing of snowfall is also shifting. An interviewee from Puthang said:

“We are observing some new activities which we have never seen or experienced before. An 85 year old grandfather told me that in his life he has never experienced snowfall in the month of Kartik (October-November). This was the incident of before last year” [TK – Hotel Owner/Mukhiya, Puthang].

Another interviewee from Kagbeni said:

“In 2008 snow fell in Baisakh (April-May) and none in Poush-Magh (December-Januray-February)” [GD – Hotel Owner/TMsC Chairman, Kagbeni].
Such changes (especially the unusual timing of the rainfall, hailstorms and frost) have destroyed crops and apples and also affected the plantation and harvesting cycles. Sharing this view an interviewee from Ghasa said:

“In our parents’ time, we use to plant and harvest everything on time. Now-a-days it rains in off season or falls at a time when it should not and vice versa” [SS – Hotel Owner, Ghasa].

The loss has been compensated by new opportunities that allowed stakeholders to grow a variety of crops and vegetables. Sightings of new wildlife also occurred in the villages. Explaining this situation an interviewee said:

“We did not have jackals earlier (20 years before) and we did not have maize farming. But because of the possibility of growing maize, animals such as jackals and bear have been spotted. So the changed environment brought changed agricultural practice and introduced new kind of animals” [TPB – Hotel Owner/CAMC Chiarman, Tukuche].

6.3.5 Interim Summary

The chapter has explored stakeholders’ perception of the vulnerability of the NBT system to climate change by examining their understanding of, exposure to and impacts of climate change. Findings show that stakeholders have a diverse understanding of the underlying causes of climate change that draws on broader sources than science-based knowledge. The broader sources are driven by their common sense perception (influenced by their daily life experiences and local memory of climate events), cultural values and beliefs and holistic understanding of climate change. The holistic understanding, which is based on their traditional knowledge, has greatly influenced stakeholders to have wider perceptions of the underlying causes of climate change.

However, it is important to note that the wider perceptions of stakeholders are not because of misconceptions or lack of understanding of fundamental process of climate change, but because of the holistic understanding of climate change, lack of access to information and confusing Nepalese terminology for climate change. These findings indicate that the general notion of stakeholders having limited understanding or that they are ignorant of climate
change impact is not entirely true in case of lower Mustang. Though it is difficult for lay people to assume a macro perspective on climate change, they are in a position to provide real observations of what climate change or climate variability means to them (NCVST, 2009). The findings show that the NBT supply system is exposed to four key climatic conditions such as the warmer winter, cold, wet and unsettled spring, intense and erratic summer monsoon and seasonal anomalies. The impacts of such changes, as shown by the perceived impact pathways, are far reaching and complex because of the intricate interactions between the exposure and impact elements. The consequence of such interactions are transformed into threat factors, such as reduced water availability, natural disasters (such as drought, flood, landslides, forest fires) and seasonality shift, ultimately affecting all three key assets of the system, namely the tourism, human and natural assets.

Reduced water availability has affected hotel operations (in the villages of Kagbeni, Puthang, Marpha and Lete), camping activity (in Upper Mustang), farming (especially villages in the southern belt where there is no irrigation) and horticulture. The findings show that the vulnerability to reduced water availability is a function of the combined effect of changed climatic conditions, increased demands by hotels/farming (in villages such as Muktinath, Kagbeni, Puthang, Marpha) and seasonal disruption of the drinking water supply and traditional irrigation system.

Vulnerability perception to natural disasters is widespread and more common in the villages below Jomsom. This is the combined effect of three key factors: the climatic factors (such as increased and intense summer monsoon), geomorphological factors (e.g., the fragile geological conditions, steep topography and forces of the Kali Gandaki river), and socio-economic factors (e.g., tourism infrastructure/facilities built on the banks of the river).

Seasonal shift is seen as an important dimension of change affecting all three key assets of NBT (e.g., extended trekking tourism season, phenology change, change in plantation and harvesting cycle and range shift). The increased trekking tourism season (September - May) and the increased visitation due to warmer winters (and the road) has been viewed positively by the stakeholders. However, the contentious problem is the implication of such higher visitation levels for the overall management of NBT supply system. It is important to note that many underlying inherent uncertainties (e.g., existing knowledge gap at the stakeholders’ level in their ability to predict climate variability, intensity and frequency of weather extremes and their impact on resources, lack of information on how changing climate is going to affect
the NBT assets) act as major constraints for stakeholders to fully capitalize on the extended trekking season. As climate induced weather extremities intensify, there is a great need for the stakeholders to respond to such impacts more proactively. The next section appraises how the stakeholders are adapting to the impacts of climate change.

6.4 Perception on Adaptation of NBT to Climate Change

In this section the stakeholders’ adaptation to climate change impacts is analysed by looking at the broader contexts, such as their attitude to the impacts of climate change and actions taken to cope with adversity. The range of information, such as perceived constraints and strategies used by the stakeholders while dealing with the adverse impact situation and their adaptive capacities, are assembled (within the specific situation of lower Mustang) to appraise their perception to climate change impact adaptation and generate insights of vulnerability.

6.4.1 Attitude

People’s attitudes reflected how different tourism stakeholders make sense of climate change and its impact on their business as well as tourism in lower Mustang. Although everyone acknowledged the occurrence of weather extremes and the seasonal shift, stakeholders do not perceive climate change as a major priority issue that can affect tourism. In fact the priority issues for stakeholders seem to emerge from the broader social, economic (Ford & Furgal, 2009) and political concerns as opposed to climate change, therefore issues related to road development and political instability appear as the highest priority issues followed by climate change (see Figure 6.7).

Figure 6.7: Priority issues for the NBT supply system based on tourism stakeholders’ perspectives (Source: In-depth interview)

9 The size of the circle represents the relative priority issue for NBT as perceived by the stakeholders.
Many stakeholders expressed views such as:

“Tourism will not be affected by climate change but by road operation. I cannot say exactly what will happen once the road is in full function” [LS – Retail shop owner, Marpha].

The reason why climate change is not a priority matter for tourism has been given as:

“No threats to tourism due to climate change impact. More will come if the winter is warm and the season is lengthened” [BAK – Hotel Owner, Muktinath].

“It’s not that they have not felt the impact of climate change but because these impacts are not devastating in nature that hamper their livelihood they don’t see the importance of, or urgency in caring about such issues” [GA – Hotel owner, Puthang].

Most stakeholders do not perceive climate change to have an adverse impact on tourism, in fact, optimism for tourism due to the lengthening of tourism seasons has been expressed. This highlights the issue that the stakeholders’ perceptions are influenced by short-term benefits. Part of the reason is also due to public fatalism driven by the fact that climate change impacts are not immediate and disastrous to tourism. This finding is consistent with the notion of the public fatalism reviewed in section 2.6.4.

The stakeholders’ apathy to climate change may also be due to the various constraints that they face to engage in climate change. Individuals perceive a wide variety of barriers to engagement in climate change issues (Lorenzoni et.al, 2007; Shackley & Deanwood, 2002), which influences their attitude towards responses to climate change (see Table 6.2).
<table>
<thead>
<tr>
<th>Perceived Constraints</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of knowledge and information</td>
<td>“How can we tackle with the issue of climate change? It is impossible. People talk about green house gas which we don’t know much about” [LS – Retail Shop Owner, Marpha]</td>
</tr>
<tr>
<td></td>
<td>“It is important for the experts to know about climate change and then come and inform us about how we are going to be affected by it and what measures should be taken to cope with its impacts. In the absence of knowledge and information one can not expect that the people know about climate change” [SBB – Hotel Owner, Lete].</td>
</tr>
<tr>
<td>Climate change is a natural process</td>
<td>“I don’t think anything can be done. The nature is doing this. If it was human driven problem something could have been done. May be scientist can do something” [GS – Hotel/Retail Shop Owner, Puthang].</td>
</tr>
<tr>
<td>Uncertainty</td>
<td>“Well it is very hard to predict what the course of nature will be. So how can we prepare ourselves? I think it is hard to control the act of nature. If only we knew where the next disaster is going to take place we could have done something to protect it from further damage” [LS – Hotel Owner/Mukhiya/TMsC Chairman, Marpha].</td>
</tr>
<tr>
<td>Ignorance due to age and lack of education</td>
<td>“Yes ignorance because there are large numbers of elderly as well as poor people who are uneducated. There are so many people who could not write their names or sign it” [SBB – Hotel Owner, Lete].</td>
</tr>
<tr>
<td>Multiplicity of the roles driven by the economic interests</td>
<td>“In my mind why people are not concerned about climate change issue is that one person is doing everything, he is running tourism business, agriculture farm, running shops, is a political leader, has vehicles. Who will question his own wrong doing” [GS – Hotel/Retail Shop Owner, Puthang].</td>
</tr>
</tbody>
</table>

Consistent with what Lorenzoni et al., (2007) and Shackley and Deanwood, (2002) found, the stakeholders’ attitudes are influenced by several constraints. These include a lack of knowledge about climate change and information on how it is going to affect tourism, climate change being a natural process and therefore not within the capacity of the individual but within the scientists’ capacity to tackle and the uncertainty that inhibits their ability to predict
the course of nature, are the most widespread reasons expressed. Since the stakeholders’ account on the changing climate and its impacts are derived from their experiential knowledge of everyday life, it is understandable that climate variability and change are seen as too scientific to comprehend and long term in their effects to be able to predict or of relevance to everyday life and hence unable to tackle with it.

Ignorance due to the presence of a large number of uneducated elderly and poor people is a crucial constraint because it has implications for the tourism services as well as stakeholders’ participation in responding to climate change impacts. As far as service operation is concerned, in the context of changing climate, having knowledge and disseminating it to the tourists is crucial for a successful tourism service operation. This is a crucial vulnerability factor that undermines the stakeholders’ ability to take part in informed decision making.

Many stakeholders claimed that people have become too opportunistic and hence busy in maximizing economic opportunities rather than worrying about environmental welfare. The notion of people’s interests in maximizing the economic opportunities by engaging in more than one economic activity may influence their perception of risks (such as climate change) when these risks may compromise their economic performance. This is consistent with Whyte (1985) who stated that the multiplicity of roles played by the individual affects the ways in which risk is perceived. What is unique in this present context is that the stakeholders have traditionally always engaged in multiple activities to diversify their livelihood. However this very practice may now blur their perception of new risks and the need to manage them. This shift from the practice of multiple activities with a goal of satisfying needs to maximizing wants (i.e. profit) means that the initial strength may turn into a weakness.

Apart from these constraints, tourism stakeholders’ attitudes towards responding to climate change impact are also influenced by various determinants (e.g., experience, perceived exposure to the probability of the climate events and impacts) and ‘personal involuntary’, which, according to Bickerstaff (2004), is the situation where the individual agrees to the presence of danger but denies that it will happen to them. For instance, stakeholders operating tourism hotels in villages (e.g., Puthang, Ghasa, etc.) with rare incidence of flood or landslides, readily admit the presence of risks, yet do not perceive it would happen in their villages.
These constraints to stakeholders’ engagement with climate change have considerable implications in acting to cope with or enhance their capacity to adapt to the impacts of climate change, which will be discussed in the following sections 6.4.2 and 6.4.3.

6.4.2 Actions

Of the many stakeholders who have acted to adapt to changing climatic conditions, their actions are driven by their subsistence strategies. These include seeking help through social networks and institutions for mutual support, adjusting or modifying livelihood options, diversifying livelihood, seeking religious/cultural solutions, migrating for better opportunities or simply waiting and watching. Some of these practices are driven by their traditional knowledge, religious and cultural beliefs; others are driven by economic reasons as well as being due to perceived helplessness (see Table 6.3).
Table 6.3: Strategies and actions taken to respond to the changing climatic condition.

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community participation</td>
<td>“In Mustang the community support and participation in social and relief work is very good. When some disastrous events happen, we provide relief support to the victim financially as well as in kind” [LP – Hotel Owner, Marpha].</td>
</tr>
<tr>
<td>Modify livelihood options</td>
<td>“In early days there were no such things as apples and not many vegetable varieties. In fact we did not even know that it was possible to grow the different varieties of vegetables that we grow now. We use to buy the potatoes from Lete and Kunjo villages, cabbage and cauliflower were something very unusual and new for us, but now we are growing all these vegetables” [LS-Hotel Owner/Mukhiya/TMsC Chairman, Marpha].</td>
</tr>
<tr>
<td>Livelihood diversification</td>
<td>“Tourism alone is not sufficient to sustain livelihood. Only 10-15 percent of the business owners solely rely on tourism, the rests have to engage in 2-3 different occupations to sustain the livelihood” [TPB – Hotel Owner/CAMC Chairman, Tukuche].</td>
</tr>
<tr>
<td>Worship the God</td>
<td>“When there is continuous rainfall say 10-12 days, we the Members of Mothers group gather to discuss how to stop this. We carry the Kangyur (religious book) around the villages asking God to stop the rain. And as a matter of fact it does stop. Also in the event of prolonged drought, we worship God of rain and again carry the Kangyur. And after about one or two days we get rainfall” [TR – Hotel Owner, Larjung].</td>
</tr>
<tr>
<td>Migrate for better opportunities</td>
<td>“The only thing that I think I can do is to shift somewhere else. Why should we unnecessarily take the risk of operating business that will be in loss?” [SBP – Dairy Shop Owner, Puthang]</td>
</tr>
<tr>
<td>Wait and watch</td>
<td>“The warming of temperature and the unusual weather patterns has destroyed our apples. So this year has been just a trial. We will have to wait and see for 2-3 more years” [TPB- Hotel Owner/CAMC Chairman, Tukuche].</td>
</tr>
</tbody>
</table>

Community participation has been an important strategy in overcoming challenges. The community approach in NBT management is a key strategy that stakeholders have used through sharing and seeking mutual support. Social networks (e.g., Mukhiya system) and local institutions (e.g., CAMCs, TMsCs MGs) have been important in fostering community participation for social, community and relief work.
Modifying livelihood options is an important strategy used by stakeholders to withstand mountain hardships, as well as maximize opportunities. These actions are influenced by reasons such as their resilient character (to withstand the adverse mountain environment, climate and socio-economic marginalization), changing climate, socio-economic opportunities and technological and institutional support.

Livelihood diversification is an important adaptation strategy used by stakeholders to reduce vulnerability in lower Mustang. This, according to Kelly and Adger (2000), is an important risk-spreading strategy related to uncertainty and surprise. The diverse livelihood options of the stakeholders based on a seasonal calendar have been discussed in section 5.1.

One unique finding of this study is the culturally and religiously motivated adaptation strategy practised by women to cope with adverse climatic events (see Plates 6.11 and 6.12). This highlights the fact that gender is an important factor in how stakeholders understand and respond to climate change. This explicitly highlights the cultural values and belief system (Lorenzoni, 2007) and its importance within the society.

Plate 6.11: Kangyur (the religious book) being tied at the back of a woman
Plate 6.12: People carrying Kangyur along the village
However, with changes in weather-related phenomena and their unusual impacts, the stakeholders currently are confused and bewildered. Annual and seasonal climate cycles are becoming more and more unfamiliar to locals. Religious and cultural practices are falling short in the face of changing climate. Local manifestations of global climate change impacts are therefore huge and stakeholders are confronted with immense challenges to comprehend and respond to such a situation. Many stated they have adopted the strategy of ‘wait–and-watch’. Should things get worse, the most common options expressed by many were relocating the business in a safer location (migrating for economic reasons).

Very few who understood the complexity and vastness of the impacts have the accompanying sense that responding to such impacts as well as effective adaptation requires global partnership and shared responsibilities.

### 6.4.3 Adaptive Capacity

The adaptive capacity of the tourism stakeholders are influenced by various socio-economic characteristics such as the demographic factors (e.g., gender and age); knowledge and awareness, several measures of social well-being, such as social security and networks, and institutional support (see Table 6.4). These factors influence stakeholders’ understanding of what constitutes a vulnerable factor for the NBT system, including climate change.

**Table 6.4: Adaptive Capacity of the Tourism Stakeholders.**

<table>
<thead>
<tr>
<th>Capacity Element</th>
<th>Variables</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demography</td>
<td>Gender</td>
<td>“In the event of excess of rainfall or drought, we gather for a meeting to discuss whether to perform worship in Tama village, or carry the 108 religious scriptures of Lord Buddha, known as the ‘Kangyur’ around the village. Now-a-days I don’t know why the elderly men are not keen on following this ritual, looks like they have no faith in religion anymore. They say it is of no help. But we women say of course it will help, we have to have faith in him and moreover it is our religion” [TR – Hotel Owner, Larjung].</td>
</tr>
<tr>
<td>Topic</td>
<td>Quote</td>
<td>Source</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Age</td>
<td>“It’s been only two years since I stopped operating this hotel. We have become old now and there are no children around to help run the business at the moment” [SBB - Hotel Owner, Lete].</td>
<td></td>
</tr>
<tr>
<td>Knowledge and awareness</td>
<td>“We have been constantly working to protect our area and our lives since the beginning. Where we are is due to our effort to cope with the changing environment and the situation. It is not something which happened overnight, but through our continuous effort and mutual cooperation to help one another” [LS – Hotel Owner/Mukhiya/TTsC Chairman, Marpha].</td>
<td></td>
</tr>
<tr>
<td>Experience</td>
<td>“Disasters in the form of flood come every year in Thade Khola. That is why we have spent lot money in protecting this place with gabion wall, constructed irrigation canal and water channels. Once a year, one member of the family above 18 years contributes a voluntary work to repair the water and irrigation canals” [TB – Hotel Owner, Larjung].</td>
<td></td>
</tr>
<tr>
<td>Social security and networks</td>
<td>“No. There is no such thing as insurance. It is not common here” [TR – Hotel Owner, Larjung].</td>
<td></td>
</tr>
<tr>
<td></td>
<td>“Some people from insurance company did come to our area suggesting us to insure our property, but none of us have done so. However as our road is not good we have insured our vehicles. Time will come for insuring property too. But if we think seriously it is important to insure our business too” [TK – Hotel Owner/Mukhiya, Puthang].</td>
<td></td>
</tr>
<tr>
<td>Government/ACAP relief support/fund</td>
<td>“……in the meeting it was informed that if I lose my property due to landslides or any of that sort, all I get is Rs. 15,000. What can you do with Rs. 15000?” [TK – Hotel Owner/Mukhiya, Puthang]</td>
<td></td>
</tr>
</tbody>
</table>
Informal support ‘Dhikuri’  “if you have the financial problem and have no means to support your livelihood or if you have some bad debt to clear, then we play Dhikuri to support you. Depending upon the amount needed to support you, each member of the group contribute the equal amount of money. You may use that money either to pay back debt or, use money for goat farming or agriculture or invest in other businesses” [TP – Retail shop Owner/CAMC Chairman, Lete].

Mukhiya  “We talk about the daily life issues. At the moment the main problem in this area is the drinking water. We have lots of migrant coming in this area for settling down, so management of migrants and development related issues is what we talk about” [GA – Hotel Owner, Puthang].

Institutional support  CAMC TMsC MGs  “We, CAMC along with political organizations, experts etc must all raise the issue and put it forth the respective organization to address both the road and climate change issue and develop a long term program to tackle it. If we do this we can tackle this issue if not we cannot then it will be disastrous to the Mustang District” [TAB – CAMC Chairman/Farmer, Marpha].

“Limited funding for CAMC from ACAP is an important issue. At the VDC level each CAMC gets a sum of Rs.350,000 to 400,000, which is not enough to carry out multiple activities” [TS – Hotel Owner/CAMC Secretary, Larjung].

Gender perspective is a very important parameter to assess the vulnerability not because women have limited access to resources or that they are not empowered, but because they hold a strong cultural and traditional faith in everything related to nature, environment and socio-economic practices. This understanding is even more important because the majority of tourism businesses in lower Mustang are run by women. As discussed in section 6.4.2, due to the rapid and complex global climate change and its impact, their observations and cultural practices of reducing risks from weather-related disasters are becoming less successful. With men showing less interest in following such practices, it is likely that in future the cultural belief system may erode as it become less meaningful. This will have implications for managing the cultural landscapes, which is an integral component of the system.
The aging population and lack of young people is an important vulnerability factor for interest and energy to adapt to the impacts of climate change. Many stakeholders said that the responsibility for looking after the hotel, farm and trade is taking great toll on their frail body and mind and they lack confidence in their ability to tackle the issues related to climate change. Therefore, the number of ‘just’ literate or illiterate elderly is a barrier to meeting the issues related to livelihood beyond daily chores. This is the most contentious issue that has made people unable to think of the issues that are going to affect NBT.

People of lower Mustang have adapted in a number of ways throughout the different stages of their life culturally, environmentally and economically. Through this they have accumulated socio-cultural mechanisms to deal with the changing environmental and socio-economic conditions. Traditional knowledge and skills have a strong resilience within their society. Because the natural and human assets form the basis of the NBT subsistence and stakeholders have a close relationship with these resources, traditional knowledge is an important dimension.

However, in the changing socio-economic (e.g. migration) and climate change contexts, vulnerability from the point of view of retention of traditional knowledge and skills to adapt to changing situations is high in lower Mustang. In the absence of local youth, traditional knowledge and skills, once universal, have now become restricted to elderly people who are either too old to follow, show less interest (such as following ritual practices) or are mostly forgotten due to the oral tradition. As Berkes & Jolly (2001) stated, traditional knowledge comes out of people’s everyday life experiences with their land and environment, and as the nature of this practical engagement changes so does the reservoir of local knowledge.

As most of the villages below Puthang (especially Marpha and Larjung) have been susceptible to natural disasters, stakeholders in those areas have strong experiential knowledge about responding to disaster related events.

The existence of formal compensation arrangements, such as property insurance, are totally new and no one has insured their hotel or business. Government or ACAP’s support in the event of natural disasters does exist but the amount given is insignificant and hence does not eliminate the barriers in the stakeholders’ ability to cope with the adverse impacts. A non formal and traditional compensation arrangement called ‘Dhikuri’ is successfully practised in this area. This scheme supports the victims of tragic events such as those who have lost their
property in natural disasters, or those who are trapped in debt due to business failures (NTNC, 2008), who needed money to go abroad for work or medical treatment and so on. To date, people rely on ‘Dhikuri’, which has proven a most successful safety net for helping people who are vulnerable to unforeseen, undesirable and unprecedented socio-economic crises. The social networks, such as the Mukhiya system, are important traditional institutions looking after the administration and management of village development affairs. Mobilization of the community or seeking other institutional support for disaster related relief work is an important capacity existing in the region.

As the adaptive capacity is in part determined by the institutional support, the financial and governance capacity of CAMCs, TMsCs and MGs are two of the most important issues. The vulnerability due to governance capacity has been discussed in sections 5.2.2 and 5.2.2.1. The mounting stress due to weakening governance, coupled with limited funding to address some issues have affected the sustainable NBT management within lower Mustang.

6.5 Chapter Summary

The chapter examined stakeholders’ perceptions of the vulnerability of NBT to climate change by exploring their understanding of perception of exposure to and impacts of climate change and adaptation. Stakeholders have wide perceptions and knowledge of climate change, from broad sources driven by their common sense, cultural values and beliefs and a holistic understanding of climate change. The notion that lay people are ignorant about climate change impact is not entirely true in lower Mustang. Although it is difficult for the lay people to comprehend the issues related to climate science and its processes, the stakeholders have provided detailed accounts of the perceived exposure to and impact of climate change in the NBT system.

The findings show that the NBT system is affected by a range of weather events (e.g. warmer winter, increasing temperatures, more variable monsoon and seasonal anomalies), resulting in several threats such as reduced water availability, natural disasters and seasonality shift. However, vulnerability to such threats and their effects is varied within the villages and is a function of the combined effect of climate and non climate factors.

The chapter also explored the stakeholders’ perceptions of adaptations to the impacts of climate change and, from their perspective, climate change is not a ‘front-burner’ issue
compared with issues such as road development and political instability, which pose numerous development challenges but also opportunities for economic maximization. Therefore, stakeholders’ perceptions of risk are strongly mediated by other imminent stressors that are showing more immediate effects than climate change.

The stakeholders’ apathy regarding climate change is due to various constraints such as knowledge and informational constraints and a sense of powerlessness (the issue is too scientific to comprehend and long term in its effects or little relevance to everyday life) (Bickerstaff, 2004). Uncertainty inhibits stakeholders’ ability to predict the course of nature or how it affects tourism and is an important vulnerability dimension. Stakeholders perceive climate change to have a positive impact on tourism thus their understanding about climate change is strongly mediated by the short term perspective. These findings agree with those of Whyte (1985) who stated that people perceive or have good memory of short term climatic events. However, such an attitude is also related to the larger number of ‘just’ literate or illiterate elderly people left in the villages.

Although the multiplicity of roles played by stakeholders is an important risk minimizing strategy, many stakeholders perceive such engagement as an issue of constraints. These roles influence stakeholders who thus have a biased attitude to respond to climate change impacts.

The findings also show that stakeholders respond to climate changes through collective and individual actions that included modifying (switching crops, tourism business) or diversifying the livelihoods, value (cultural) based coping responses and migration for better opportunities. These strategies provide considerable buffering capacity when dealing with climate change (Berkes & Jolly, 2001). Many also adopted the strategy of ‘wait and watch’ as the best option to deal with the issues related to the impacts of climate change.

Adaptive capacity is another important dimension that highlighted the stakeholders’ position and their vulnerability to deal with climate change impacts. An important finding here is the variability of adaptive capacity (or vulnerability situation) exhibited by stakeholders, and therefore the NBT system, to the consequences of climate change. For instance, demography, knowledge and awareness, access to social security/capital/networks and institutional support resulted in different exposure to the impacts of climate change and hence different sensitivity and adaptive capacity. Women, despite their empowered position in the society (e.g., strong social positions in assets holdings, tourism business ownership, as well as access to resources
and decision making), face different constraints. They are generally culturally more sensitive in responding to climate change impacts. Their history of adjustment of livelihood through religious or spiritual practices is an important capacity.

However, these capacities that have enabled them to cope with adversities and adapt to change in the past, may or may not suffice in the future in changing environmental and climate conditions. Whilst understanding about the stakeholders’ perceptions about climate change impacts and their capacity, it is important to note that their ability to respond to the impacts through actions and policy depends upon the enabling environment and governance. This is because, besides broader social change and other stressors (Ford & Furgal, 2009), the adaptive capacities of the stakeholders are shaped by the governance capacity of the institutions. Therefore, climate change problems are social constructs that reflect institutional, political and social dynamics and changes (Jasanoff & Wynne, 1998, as cited in Shackley & Deanwood, 2002).
Chapter 7
Conclusion and the Way Forward

Lower Mustang is experiencing a phenomenal phase of social change driven by multiple stressors, both non-climatic and climatic. NBT in lower Mustang constitutes a major part of the local economy as well as a great incentive for nature conservation and sustainable NBT management. The dynamics of changes brought about by these stressors and especially climate change are important vulnerability contexts for the tourism stakeholders of lower Mustang. However, these issues remain a highly unexplored research area in lower Mustang where its stakeholders are most vulnerable (socially, technologically and financially) to climate change.

This chapter is divided into three sections. Section 7.1 provides a summarised overview of the research objectives and methods used. Section 7.2 summarises the main findings and the discussion based on the model of the overall vulnerability of the NBT supply system to multiple stressors, thus providing an “on-the-ground” perspective on the actual vulnerability status of the system of lower Mustang. This section also helps us understand the interplay of climate change with the other major change factors influencing the NBT supply system of lower Mustang. As some research findings have applied value (Espiner, 2001), section 7.3 outlines the implications of the results for sustainable NBT management and policy approaches in relation to climate change and other threat factors. The contributions and future study based on the findings of this study are discussed in sections 7.4 and 7.5.

7.1 Research Overview

The aim of this study was to understand stakeholders’ perspectives of various vulnerability contexts for the NBT supply system in lower Mustang, with special emphasis on climate change. The need to understand stakeholders’ perspectives necessitated the exploration of grassroots and place-based knowledge. This was carried out by exploring the dimensions of the key drivers of change, analysing the sensitivity and adaptive capacity of the system, thus gaining a more realistic understanding of the vulnerability to climate variability and change on tourism. A vulnerability assessment framework informed by a broader definition of vulnerability provided by the IPCC, was developed. The analysis of vulnerability of the NBT system to climate change and the discussion that followed were informed by the
conceptualization of both the political economy (Füssel, 2009) and human ecology (Füssel, 2007).

The dynamism of changes brought by the multiple stressors such as socio-economic/land use change, political change and climate change in lower Mustang led to the selection of this region as the case study. Approximately 30 participants were selected for in-depth interviews. Purposeful and snowball sampling techniques were used to select potential participants. Stakeholders selected included tourism stakeholders with significant interests in NBT service operation (e.g., hotel/lodge owners, guides, retail shop owners, porters) or the decisions made concerning its management in lower Mustang (e.g., CAMCs, TMScs, MGs, Mukhiyas).

The specific objectives of the study were:

- review the literature on vulnerability, nature based tourism, climate change and public understanding of climate change;
- investigate tourism stakeholders’ perceptions of and responses to the impacts of climate change;
- analyse the vulnerability of NBT to climate change impacts from the tourism stakeholders’ perspectives; and
- explore the interplay of climate change with other major factors influencing NBT in the Mustang region.

7.2 Overall Vulnerability of NBT Supply System in Lower Mustang

The chapters on vulnerability due to climate change found that the NBT supply system is exposed to and is impacted by climate variability and change. However, it is also evident that climate change is occurring amidst a number of other socio-economic and political changes. Therefore, perception of vulnerability of the NBT system to climate change is a multidimensional issue and must also consider the effects of other diverse changes. A model of the overall vulnerability of the NBT system to climate change, based on stakeholders’ perspective is shown in Figure 6.8.
Figure 6.8: Tourism stakeholders’ perspectives on vulnerability of the NBT supply system in lower Mustang.

As shown in Figure 6.8, the system is exposed to non climatic factors (e.g., socio-economic and land use change and political instability) and climatic factors (e.g., climate variability and climate change). The rapid socio-economic transformation due to the Beni-Jomsom road has brought a myriad of changes in the types of tourism services, tourism activities, transportation, land use and settlement patterns, migration/population dynamics and the market economy. The low carrying capacity and the vulnerability to intense pressure from market and other demographic forces (Nyaupane & Chhetri, 2009) are likely to make lower Mustang very sensitive to these changes.

Although fragility is a key tourism asset (Nepal & Chipeniuk, 2005), the very fragile nature of the mountain environment requires tourism development to be carried out in a way that it does not exceed the carrying capacity of lower Mustang. For instance, resource limitation, be it land, forest resources, agricultural produce, water, population density does not allow the area to be developed without drastic impacts on these resources. Therefore the scale and intensity of development is an important issue when considering sustainable NBT development in lower Mustang. When a park becomes increasingly popular for tourism, there is a danger that
tourism runs astray, resulting in detrimental development of sites and facilities with negative effects on the tourism resource base (Nepal, 1997). This risk in lower Mustang arises from the planned Kali Gandaki Highway that will place Mustang on an important transit route between India and China. This will change the nature of NBT and is likely to increase its vulnerability. Visible changes in both temporal and geographical aspects of NBT are already being experienced due to the Beni-Jomsom road. These change processes are an important vulnerability factor for the NBT supply system and its management.

Migration, especially the out-migration of local youth (for studies, foreign jobs, etc.), and in-migration of people from other districts (to fill the labour market) is another important threat perceived by the stakeholders, mainly with respect to maintaining village customs and cultural practices/norms, economic sovereignty and the sustainable growth of NBT in lower Mustang. Infiltration of the local subsistence economy by the cash-based global economy has also exposed the stakeholders to a more competitive volatile market. Excessive transportation of the local goods has created a price increase of produce resulting in profit marginalization of some tourism businesses.

Regime change, the ongoing political instability and the weakening governance capacity of the stakeholders (such as CAMCs, TMsCs) has further heightened the sensitivity of the system. Lower Mustang provides important evidence of how sensitive the NBT supply system is to the political instability. Therefore, structural changes resulting from socio-economic and land use change and political instability are key concerns of stakeholders in lower Mustang. In the context of rapid socio-economic transformation and a society where governance is impacted by the ongoing political instability, human induced environmental change, especially the climate change, is going to add pressure to a system already under stress.

The study provides valuable insights into stakeholders’ understanding of climate change; their perception of exposure to and impacts of climate change and adaptation. The stakeholders’ have a wide range of perceptions and knowledge on climate change, which they draw from broader sources than science based knowledge. The broader sources are driven by their common sense perception (influenced by their daily life experiences and local memory of climate events), cultural values and beliefs and holistic understanding of climate change. Therefore, the notion that lay people are ignorant about climate change impact is not entirely true in lower Mustang. Although it is difficult for the stakeholders to comprehend the issues
related to climate science and its processes, they provided a detailed account of the perceived exposure to and impact of climate change on the NBT system.

The climate is affecting all three key assets (tourism, human and natural) of the NBT system of lower Mustang. Warmer winters, increased and intense summer monsoon, cold, wet and unsettled spring and seasonal anomalies, which are interacting between and within each other and the impacted elements, result in important threat factors such as reduced water availability, natural disasters (such as drought, flood, landslides, forest fires) and seasonality shift.

The stakeholders’ response to climate change impact and adaptation is influenced by their attitude and actions to cope with the situation. The findings also show that climate change is not a ‘front-burner’ issue for most stakeholders. At face value this may imply that many tourism stakeholders could not meaningfully interpret the notion of climate - environment – tourism relationships, tourism sustainability and their own roles in relation to it. The stakeholders understand and value nature and culture for tourism, but the current trajectory of socio-economic development, driven by the two factors of the Beni – Jomsom Road and restructuring the nation from a kingdom to a republic, have brought social, economic and political upheaval to the area, with significant impacts on the NBT system. This situation has marginalized or excluded problems such as the impacts of climate change as either insignificant or low priority. This shows that the stakeholders’ perceptions of risk are strongly mediated by other stressors that are showing more immediate impacts than climate change.

The results also show that the impacts of and responses to adapting to climate change are spatially and socially differentiated because of various constraints (e.g., knowledge, information, age, education) and strategies used by the stakeholders in taking actions to adapt to climate change impacts. Local strategies (e.g., livelihood modifications/diversification, migration, cultural and religious approach) and the participatory management approach have been crucial to the stakeholders in managing the NBT supply system in lower Mustang. These strategies, with their inherent capacities such as gender empowerment, traditional knowledge and skills, social networks/capital and institutional support have been crucial in managing change.

The study also shows that participatory management using the traditional knowledge alone is not sufficient since many stakeholders stated that ‘wait-and-watch’ or migration as the only
options in response to such impacts. The study clearly shows that stakeholders have very limited awareness of climate science and information, insufficient understanding of the sensitivity of tourism to climate change and limited ability to make informed decisions for planning and managing tourism in lower Mustang.

The stakeholders’ understanding and their attitude to respond to the impact of climate change is strongly influenced by socio-economic forces and the political context. From the perspectives of tourism stakeholders, it is evident that their attitudes to respond to and the adaptive capacities are embedded within the demographic, social, institutional, economic and environmental contexts. The vulnerability perception of stakeholders from this perspective is a socially embedded construct. Therefore the stakeholders’ vulnerability context to climate change exposure, impacts and adaptive capacity needs to be considered in the broader context of socio-economic and political change and risk governance.

7.3 Implications of Study Findings

The road development and changing tourism dynamics, farming, development and land use practices and ongoing political instability is affecting the NBT supply system and the governance capacity of the stakeholders. These factors are likely to increase the vulnerability situation for long-term NBT management in lower Mustang. Similarly, the sensitivity of the NBT system to climate change and the limits of stakeholders’ capacity to adapt to its impact have become apparent, in the current circumstances of imminent multiple non-climate threat factors. Therefore, the NBT supply system is going to be affected through the climate change impacts on the diverse resources and the stakeholders in diverse ways, resulting in varied implications.

7.3.1 Social and Environmental Implications

The shift in the image of this region from being the ultimate destination for NBT to a multi-faceted, multidimensional tourism hub centre with various tourism activities occurring is affecting both social and environmental carrying capacity (such as traffic management, congestion, deforestation, pollution) of the area. In addition to this, a wide range of climate-induced environmental changes (Simpson et al., 2008) such as changes in water availability, seasonality shift, reduced aesthetic beauty of landscapes; phenology change, species loss (due to habitat loss), increased natural hazards is also affecting tourism to varying degrees. Species
loss and ecosystem change will have enormous impacts on NBT (Hall & Higham, 2005) of lower Mustang. The altered seasonal calendar and the impact on agricultural and horticultural production is another important implication for tourism. Therefore the combined effects of social and climate change are resulting in significant implications in all three assets of the NBT supply system of lower Mustang.

7.3.2 Management Implications

The study shows that in the changing socio-economic and political situations, the capacities of the stakeholders (e.g., CAMCs, TMsCs) to regulate and manage tourism development within lower Mustang has been inhibited. From these findings, it is evident that the issues compounded by these changes are imminent risk factors with significant implications in the overall management of the NBT supply system in lower Mustang.

The study has also found that the sensitivities of the system to climate variability and change are equally high. The stakeholders have rich local knowledge yet limited awareness related to climate science as well as insufficient understanding of the sensitivity of tourism to such changes. A greater awareness of climate science and information is needed not only for long-term planning but also to deal with existing conditions (Smith, 1990). The best way forward is probably through a strategy that integrates a better understanding of present weather and the climate sensitivity of tourism (Smith, 1990) with strong scientific data and information as well as understanding the tourism development pathways in the present socio-economic and political changes and weaker governance.

Since lower Mustang is a high Himalayan mountain region, the mountain specificities and climate interplay (Nyaupane & Chhetri, 2009), coupled with the above impacts have several implications for the NBT supply system. These could potentially affect the destination appeal, transportation infrastructure and operations, the resource base (natural and human), the sustainability of tourist facilities and the destinations (Becken & Hay, 2007).

Considering the broad all encompassing nature of the vulnerability contexts, an increased urgency in reframing NBT policy, planning and management is required. Such policies and planning also need to incorporate the threats posed by climate change, both to enhance the capacity (Palosuo, 2009) of the stakeholders and to reduce the threats on NBT supply
systems. This reality requires that stakeholders begin an additional focus on “managing for change”.

7.4 Contribution of the Study

The literature reviewed in Chapter 2 indicated a lack of empirical studies on the vulnerability and tourism stakeholders’ perceptions related to climate change in Nepal, let alone ACA or lower Mustang. This meant a lack of information and hence no documentation of climate change. The contribution of this study in this regard has been filling this gap by providing a first “on-the-ground” perspective and comprehensive assessment of the vulnerability context of the NBT supply system to climate change. Furthermore, the focus on assessing the local contextual vulnerability using a bottom up approach provides an important contribution to understanding how people at the grassroots understand climate change, what awareness level and issues related to climate change exist and how it is impacting their livelihood.

The study also provides a systematic methodology and an applied conceptual framework for assessing vulnerability of the NBT supply system to climate change. Using this framework, the study provides an account of the factors and processes that shape the vulnerability context for NBT supply production. The method also helps identify the vulnerable assets providing a fundamental basis to inform the prioritization of policy intervention and adaptation in the face of emerging climate change impacts and other multiple stressors. The study also provides a future direction and an opportunity for stakeholders to help establish partnerships to undertake relevant research. As the main findings have applied value, they provide a fundamental basis for planning and managing the NBT system in the face of global climate change impacts and adaptation.

7.5 Priorities for Future Studies

The following discussion points out the direction of future priorities and research areas and policy development for sustainable NBT management in lower Mustang.

The knowledge gap in the current situation due to a lack of scientific study and information emerged as one of the central issues behind stakeholders’ understanding of climate change. This highlights the strong emphasis on detailed scientific research and knowledge production
(such as climate variability, its projections and effects on NBT) and linking it with local traditional knowledge.

There is also the need for greater awareness, information and dialogues amongst stakeholders for better understanding of the climate related risks/opportunities. Better prospects for mobilizing stakeholders’ interest and concern are possible if climate change impacts can be demonstrated ‘on-the-ground’.

There is also a strong need to conduct more studies of the impacts of climate change on the vulnerable assets identified in this study. These include water and forest resources, farming, traditional designs and culture and how they affect the NBT of lower Mustang. Research on phenology change and the response of flora and fauna to warming conditions and seasonal anomalies should also be conducted.

Research programmes on adaptation should be included as part of long term policy research as well as a stakeholders’ capacity building process. Although this study focused on stakeholders’ perspectives on vulnerability issues of NBT with particular interest in climate change, changing tourism dynamics due to the Beni-Jomsom road is an important risk dynamic. In addition, other drivers of non climatic factors such as land use-land cover change, migration, natural resource use, governance and policy gaps are likely to influence the NBT system. Studies by several researchers have found land use-land cover change and other socio-economic changes to have complex consequences for ecosystems (Gössling & Hall, 2006) and a great influence on terrestrial biogeochemical processes and climate change through its feedback system (Houghton, 2008; Wu, Zhang & Krause, 2010). Studies to understand the roles of the non climatic drivers and how they interact with climate change should be an important priority.

The complex nature of the impacts on the NBT supply system resulting from socio-economic and political change necessitates the policy for climate change to be developed based on insights extracted from wider social, economic and political concerns. There is therefore a strong need for more community-based case studies involving a wider range of stakeholders to understand the dynamics of vulnerabilities and to facilitate policy formulation.

Vulnerability perception, being a socially embedded construct investigating differentiated vulnerabilities across different villages and types of stakeholders, also deserve further study.
References


Burton, I. (2003). Do we have the adaptive capacity to develop and use the adaptive capacity to adapt? In J.B. Smith, R.J.T. Klein & S. Huq (Eds.) *Climate change adaptive capacity and development*. Imperial College Press, London.


IUCN. (2008). Indigenous and traditional peoples and climate change. IUCN


Appendices
Appendix A: Interview Guide

Fact Sheet

Date:
Location:
Interviewee Id:
Age:
Education:
Gender:
Position of the Interviewee:
Time of Interview:
Duration of Interview:

Exploring the vulnerability contexts

1. What are the dimensions of vulnerability in nature based tourism in ACA in general and lower Mustang in particular?
   - What kinds of NBT service do you provide/operate/manage in lower Mustang?
   - How long have you been involved in this service?
   - How is the service/business/programme running?
   - In terms of your service (e.g., hotel/lodge/restaurant/shops/guiding/portering etc) operation, what has changed over these years?
   - What do you think about these changes?
   - In your opinion what are the key opportunities related to nature based tourism in lower Mustang?
   - What are the key threats related to nature based tourism in lower Mustang?

2. To what extent is climate change documented in ACA and or in lower Mustang?
Investigating Awareness, Knowledge and Attitudes

3. What perception does stakeholder have on vulnerability of NBT to climate change?
   - What do the stakeholders understand by climate change?
   - Do you feel that the pattern of weather is changing in your area?
   - In what way is it changing?
   - Have you in the past ten to twenty years experienced any changes in rainfall/snowfall patterns/temperature?
   - How has it changed?
   - Have you in the past ten to twenty years experienced any form of natural disaster related event in this region?
   - How often is the event occurring?
   - Have you heard of ‘climate change’? If yes, where have you heard it?
   - What do you understand by climate change?
   - What are the perceived reasons for climate change?
   - What impacts if any do you think climate change have in your service/business/programme?
   - How is this impact (either positive or negative) affecting your service/business/programme?

4. How are the tourism stakeholders responding to the climate change impacts? If not, why not?
   - Do you think anything could be done to address the issue related to climate change?
   - What do you think can be done to address this issue?
   - Who do you think should have the main responsibility to tackle the issue of climate change? And why?
   - What actions have you taken or intend to take to tackle the issues of climate change? If not why not?
   - How do perceptions in climate change vary across different types of tourism stakeholders?
5. How does climate change feature in the context of a wide range of vulnerabilities to NBT in lower Mustang?

- What are the major issues for NBT in lower Mustang and why?
- What will be the major issues for NBT in lower Mustang in future and why?
### Appendix B: Stakeholders’ Profile

<table>
<thead>
<tr>
<th>No</th>
<th>Interviewee Id</th>
<th>VDC/Village</th>
<th>Profession</th>
<th>Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SBB</td>
<td>Ward no. 5, Lete/Lete</td>
<td>Hotel Owner/Contractor/Trader</td>
<td>Male</td>
</tr>
<tr>
<td>2</td>
<td>TP</td>
<td>Ward no. 5, Lete/Lete</td>
<td>Retail Shop Owner/CAMC Chairman</td>
<td>Male</td>
</tr>
<tr>
<td>3</td>
<td>GL</td>
<td>Ward no. 6, Lete/Kalopani</td>
<td>Hotel Owner/Farmer</td>
<td>Female</td>
</tr>
<tr>
<td>4</td>
<td>NH</td>
<td>Ward no. 6, Lete/Lete</td>
<td>Trekking Guide/Trader</td>
<td>Male</td>
</tr>
<tr>
<td>5</td>
<td>SB</td>
<td>Ward no. 3, Lete/Ghasa</td>
<td>Hotel Owner/Retail Shop Owner/Carpet Weaver/Farmer</td>
<td>Female</td>
</tr>
<tr>
<td>6</td>
<td>SS</td>
<td>Ward no. 1, Lete/Ghasa</td>
<td>Hotel Owner</td>
<td>Male</td>
</tr>
<tr>
<td>7</td>
<td>GV</td>
<td>Ward no. 2, Lete/Ghasa</td>
<td>Hotel Owner</td>
<td>Male</td>
</tr>
<tr>
<td>8</td>
<td>TB</td>
<td>Ward no. 4, Kobang/Larjung</td>
<td>Hotel Owner/Apple Orchard Owner/Farmer</td>
<td>Female</td>
</tr>
<tr>
<td>9</td>
<td>TR</td>
<td>Ward no. 4, Kobang/Larjung</td>
<td>Hotel Owner/Farmer/Retail Shop Owner</td>
<td>Female</td>
</tr>
<tr>
<td>10</td>
<td>TS</td>
<td>Ward no. 4, Kobang/Larjung</td>
<td>Hotel Owner/CAMC secretary</td>
<td>Female</td>
</tr>
<tr>
<td>11</td>
<td>TIB</td>
<td>Ward no. 2, Tukuche/Tukuche</td>
<td>Retail Shop Owner/Mir Mukhiya/Apple Orchard</td>
<td>Male</td>
</tr>
<tr>
<td>12</td>
<td>TPB</td>
<td>Ward no. 7, Tukuche/Tukuche</td>
<td>Hotel Owner/CAMC Chairman/Retail Shop/Apple Orchard/Micro Bus Owner</td>
<td>Male</td>
</tr>
<tr>
<td>13</td>
<td>TP</td>
<td>Ward no. 5, Tukuche/Tukuche</td>
<td>Restaurant Owner/Apple Orchard</td>
<td>Male</td>
</tr>
<tr>
<td>14</td>
<td>TS</td>
<td>Ward no. 7, Tukuche/Tukuche</td>
<td>Hotel Operator/Student</td>
<td>Male</td>
</tr>
<tr>
<td>15</td>
<td>TS</td>
<td>Dhading</td>
<td>Porter</td>
<td>Male</td>
</tr>
<tr>
<td>16</td>
<td>TAB</td>
<td>Marpha</td>
<td>CAMC Chairman/Farmer</td>
<td>Male</td>
</tr>
<tr>
<td>17</td>
<td>LM</td>
<td>Ward no.1, Marpha/Marpha</td>
<td>Hotel Owner/Farmer/Mothers Group Member</td>
<td>Female</td>
</tr>
<tr>
<td>18</td>
<td>LP</td>
<td>Ward no. 2, Marpha/Marpha</td>
<td>Hotel Owner/ CAMC Member/Farmer</td>
<td>Female</td>
</tr>
<tr>
<td>19</td>
<td>LS</td>
<td>Ward no. 1, Marpha/Marpha</td>
<td>Retail Shop/Jeep Owner</td>
<td>Female</td>
</tr>
<tr>
<td>20</td>
<td>LS</td>
<td>Ward no. 1, Marpha/Marpha</td>
<td>Hotel Owner/Mukhiya/ TMsC Chairman/Farmer/Apple Orchard</td>
<td>Male</td>
</tr>
<tr>
<td>21</td>
<td>LT</td>
<td>Chhairo</td>
<td>Souvenir Shop</td>
<td>Male</td>
</tr>
<tr>
<td>22</td>
<td>GA</td>
<td>Ward no. 5, Marpha/Puthang</td>
<td>Hotel Owner/Cyber Operator</td>
<td>Male</td>
</tr>
<tr>
<td>23</td>
<td>SBP</td>
<td>Ward no. 5, Marpha/Puthang</td>
<td>Dairy Shop Owner</td>
<td>Male</td>
</tr>
<tr>
<td>No.</td>
<td>Code</td>
<td>Ward</td>
<td>Occupation</td>
<td>Gender</td>
</tr>
<tr>
<td>-----</td>
<td>------</td>
<td>------</td>
<td>----------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>24</td>
<td>TK</td>
<td>Ward no. 5, Marpha/Puthang</td>
<td>Hotel Owner/Mukhiya/Farmer/Trader</td>
<td>Male</td>
</tr>
<tr>
<td>25</td>
<td>SMK</td>
<td>Ward no. 5, Marpha/Puthang</td>
<td>Hotel Owner/Mothers Group Chairman/Farmer/Retail Shop Owner</td>
<td>Female</td>
</tr>
<tr>
<td>26</td>
<td>GS</td>
<td>Ward no. 5, Marpha/Puthang</td>
<td>Hotel Owner /Retail Shop Owner/Truck Owner</td>
<td>Female</td>
</tr>
<tr>
<td>27</td>
<td>GD</td>
<td>Ward no. 7 &amp; 8, Kagbeni/Kagbeni</td>
<td>Hotel Owner/TMsc Chairman/ Farmer/Trader/Retail Shop Owner</td>
<td>Male</td>
</tr>
<tr>
<td>28</td>
<td>GPB</td>
<td>Ward no. 7 &amp; 8, Kagbeni/Kagbeni</td>
<td>Hotel Owner/CAMC Chairman Farmer/Apple Orchard/Jeep Owner</td>
<td>Male</td>
</tr>
<tr>
<td>29</td>
<td>BAK</td>
<td>Ward no. 1, Muktinath Muktinath</td>
<td>Hotel Owner/Trader/Retail Shop Owner</td>
<td>Male</td>
</tr>
<tr>
<td>30</td>
<td>TJ</td>
<td>Ward no. 1, Muktinath Muktinath</td>
<td>Hotel Owner/TMsc Chairman/Retail Shop Owner/Trader/Jeep Owner</td>
<td>Male</td>
</tr>
</tbody>
</table>
Appendix C: Research Information Sheet

You are invited to participate as a subject in a project examining different threats and opportunities facing Nature Based Tourism (NBT) in the Mustang region of Annapurna Conservation Area. The main focus of the study is to understand the perceptions and attitudes of the local tourism stakeholders with regard to the threats and opportunities of various changes taking place in this region.

Your participation in this project will involve giving an interview with the researcher in which structured interview questions will be asked to you. The entire interview should take less than sixty minutes.

The results of the study will be used in the preparation of the researcher’s Master’s Thesis at the Lincoln University. The result may also be published, but you will be assured of the complete confidentiality of data gathered in this investigation. Your identity will not be made public without your consent. To ensure anonymity and confidentiality the following steps will be taken:

- No names or other similar uniquely identifying data will be collected
- The information given by you will be coded into an identity that protects your specific title
- Analysed (transcribed, coded and thematised) data for potential readers will be presented to ensure the continued maintenance of anonymity

Moreover, participation in this interview is voluntary and you may withdraw your consent at any time, including withdrawal of any information you have provided. In such event any information obtained will be destroyed.

The project is being carried out by principal researcher Anu Kumari Lama under the supervision of Dr. Stephen Espiner and Dr. Susanne Becken. Should you need to discuss any concern you have about participation in the project, you could contact the researcher at the address mentioned below.

Contact details:
Faculty of Environment, Society and Design (FESaD), P.O. Box: 84, Lincoln University.

The project has been reviewed and approved by Lincoln University Human Ethics Committee.
Appendix D: Consent Form

I have read and understood the description of the above-named project. On this basis I agree to participate as a subject in the project, and I consent to publication of the results of the project with the understanding that anonymity will be preserved. I understand also that I may at any time withdraw from the project, including withdrawal of any information I have provided.

Name: _____________________________________________

Signed: ___________________________ Date: ________________