

# Mountain Tourism and Climate Change: Implications for the Nepal Himalaya

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## Abstract

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Despite the global nature of tourism industry and its economic contributions, scholars of climate change research have hardly acknowledged the threat of climate change to the tourism industry. Tourism scholars have rectified this situation to a certain extent by demonstrating how the industry has become vulnerable to climate change and drawing attention to the need for adaptation and mitigation strategies specific to this sector. This paper provides an overview of climate change challenges in tourism destinations in the mountains, with a particular emphasis in developing countries and with specific reference to the Nepal Himalaya. It outlines several adaptation strategies at the local, state and national levels. Climatic effects on high mountains are very specific; climate change is likely to trigger the rates and intensity of natural hazards such as landslides, avalanches and flooding with dramatic consequences for tourism destinations. Adaptation strategies in the context of natural hazards must consider the level of risks and weigh it against costs and benefits of adaptation. If benefits outweigh the costs, it is likely that the level of local responses to adaptation will be high. If the level of risk and associated costs is too high, local communities may be fatalistic in their attitude to climate change impacts. The paper outlines adaptation strategies for tourism stakeholders, resident communities and governments and emphasizes that climate change strategies in the tourism sector must be considered as a collaborative effort, with considerations for institutional development, diversification of opportunities, equity and sustainable economic growth.

**Key words:** *Mountain tourism; Nepal Himalaya; Climate change; Natural hazards; adaptation strategies*

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## Introduction

Mountain regions worldwide are affected by climate change. Indeed, mountains represent unique areas for the detection of climate change and the assessment of climate-related impacts (Beniston 2003; Messerli & Ives 1997). The Intergovernmental Panel on Climate Change (IPCC) has predicted dramatic impacts on mountain ecosystems as a result of climate change. Changing climates will potentially alter the seasonal patterns of tourism with consequences on the mountain environments. It is therefore critical to develop adaptation and mitigation strategies specific to mountain environments. The IPCC does not mention tourism as an area that could be impacted by climate change; various tourism scholars have

recently raised concerns about impacts of climate change on the tourism industry, but their efforts have been limited to mountains in the developed countries. Therefore there is a critical need to systematically investigate specific impacts that climate change could have on mountain tourism in the developing countries and adaptation and mitigation strategies necessary for a successful transition to a post-warming world. This paper has three main objectives:

- 1) provide a definition of mountain tourism
- 2) provide a discussion of climate effects in the mountains with specific reference to the Nepal Himalaya
- 3) explore adaptation and mitigation strategies from the local and regional perspectives.

### **Mountain Tourism**

Nepal and Chipeniuk (2005) have argued that the definition of mountain tourism should expand to include, in addition to touristic developments, outdoor recreation and amenity migration. Many popular mountain destinations in North America (e.g., Whistler, Aspen, Vail) have evolved as local attractions for outdoor recreation, only to be discovered later on by tourists, and as major international tourism destinations. Mountain tourism destinations have quickly become second homes for many tourists and in some cases, have attracted amenity migrants who have chosen to settle permanently in and around areas with significant amenity values. In the developing countries such as Nepal, mountain tourism constitutes a significant part of tourism development (Nepal 2003). Tourism destinations in Nepal including the Mt. Everest and Annapurna region are highly popular climbing and trekking destinations. Therefore, any discussion of climate change impacts on mountain tourism destinations needs to consider the wide spectrum of recreation, tourism and amenity migration related activities and in the case of the Nepal Himalaya, very specific type of tourism activities such as mountaineering and trekking expeditions.

Mountainous regions have always attracted visitors - from ancient pilgrims, explorers and adventurers to modern-day tourists. Increasingly, mountain regions have become places to play and retire and invest in tourism-related services and facilities. Visitors to mountain communities may range from casual tourists, to ski-enthusiasts, second home owners, retirees and various types of amenity migrants. A significant and more current aspect of mountain communities in the West is the growth in second homes and resort accommodations. The developing world mountains are of significant importance to tourism development. For example, in Nepal, roughly one-fourth of all international tourist visits occur in mountain destinations (Nepal 2003). The combination of ecotourism and tourism, second homes and amenity migration have fueled the economy of many mountain regions but it has also raised alarms about changing cultural values, lifestyles,

sense of place, environmental degradation, economic inflation, housing and labor shortages and community cohesion. In particular, resort accommodations and second homes in the developed countries are seen as putting further pressure on existing home stock and driving real estate prices (Nepal & Jamalv). In the developing countries, the expansion of tourism to remote mountain locations has threatened the sustainability of mountain communities in areas such as energy (Nepal 2008), land use, trails (Nepal & Nepal 2004) and conservation of protected areas (Spiteri & Nepal 2008; Khadka & Nepal 2010).

In the Nepal Himalaya, tourism is a major economic driver and one of the main sources of livelihood for mountain communities (Nepal et al. 2002). While the economic benefits are significant, the social and cultural benefits are not clear. Similarly, the environmental benefits of tourism are also questionable (Nepal 2008). It could be argued that given the current context of climate change and its implications for mountainous regions, the promotion of ecotourism as an alternative to other forms (i.e., mass) of tourism appears as a preferred choice. While mountain tourism in Nepal is still a low-scale activity, given the fragile characteristics of mountain regions, even ecotourism requires a proactive planning approach. In particular, serious considerations should be given to the type and scale of tourism developed, where and how it is developed, what support infrastructure is required and how they will be managed, how the development is linked with other social and economic sectors and what the likely implications are on its development from climate change and vice versa.

### **Effects of Climatic Changes on Mountain Tourism**

Climate change can affect tourism in a variety of ways. It could affect the appeal of a destination, disrupt transport and energy-related infrastructures, damage the natural resource base, affect tourist satisfaction, impact tourists' health and safety and influence the overall sustainability of facilities and destinations (Becken and Hay 2007). Climate is one of the most important attributes of mountain tourism. Several types of mountain recreational activities are primarily dependent on climatic conditions. For example, temperature increases are detrimental for glacier walking, mountain climbing and skiing. Many tourists consider the level of climate-related comfort when making vacation decisions (Scott et al 2008).

Generally, we could classify climate-induced impacts on mountain tourism into three broad categories:

- 1) natural hazards
- 2) health
- 3) biodiversity (Figure 1).

These are inter-related, for example, natural hazards like floods and fires have a health implication which in turn will affect a mountain tourism destination's capacity to address these issues. Similarly, fire will impact biodiversity. There are

also short-term and long-term impacts. There could be sudden surprises like a mudflow, or more long-term effects, for example, glacier recession. Similarly, there could be subtle changes in elevation shifts of certain wildlife species and more long-term impacts on mountain wildlife population. For example, consistent dry weathers could give rise to fire hazards which in turn could impact endangered and threatened species important for the tourism industry. There could be indirect effects on tourism from these three sources which would impact people's livelihood and cause displacement. These in turn will generate additional burden for the tourism destination. Many mountain communities in the Nepal Himalaya depend on tourism as their livelihood opportunity. If climate change will alter tourism development in a negative way, it implies that the local livelihood may also alter negatively. While climate change may seem like an abstract concept for a mountain resident, for those who are dependent on tourism directly or indirectly, any alteration in tourism patterns, whether climate-related or not, will impact their livelihood.

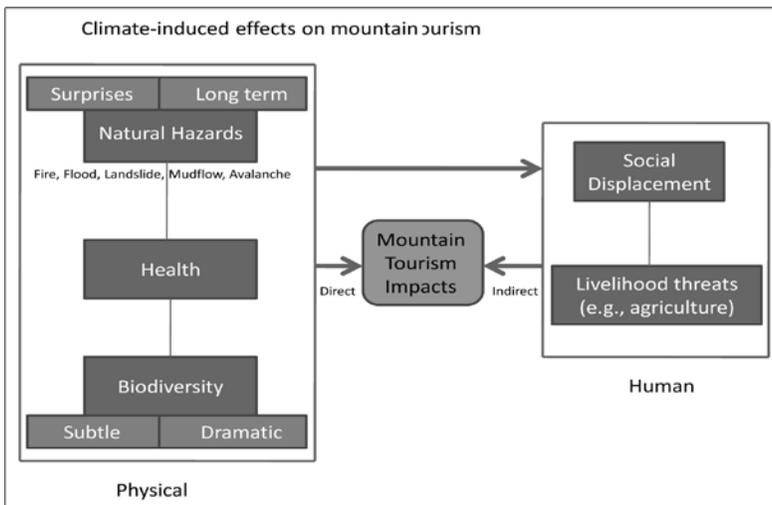


Figure 1: Conceptualizing climate-induced impacts on mountain tourism

Climate can affect recreational choice by limiting time and space for tourism activities (Scott et al 2007). While climate change at tourists' origins can change the demand for mountain destinations (Richardson and Loomis 2004), from a supply side perspective less than optimal conditions for mountain tourism can have disastrous consequences for local economy. For example, when ski hills at lower altitudes of the Swiss Alps became unreliable for snow, the number of tourists to these locations declined sharply, affecting local economies, while at higher altitudes the numbers increased significantly, putting tremendous pressure on the environment (Koenig and Abegg 1997). Similarly, it is estimated that Austria would lose 10 percent of its winter tourism revenues as a result of

snow cover loss at lower altitudes (Scott et al 2006). Scott and Suffling (2000) have demonstrated that mountain parks in Canada will potentially experience both horizontal and vertical shifts in ecotone resulting in a reorganization of species and habitat fragmentation. This applies to mountains in Asia, too, where substantial elevational shifts of ecosystems are projected, and rising temperature and seasonal variability in precipitation are expected to result in more rapid recession of Himalayan glaciers thereby impacting tourism infrastructure. Plant and animal species at higher altitudes are likely to be extirpated, as demonstrated by modeling studies conducted in Yellowstone National Park (Bartlein et al 1997). In Glacier National Park, 115 of 150 glaciers have disappeared while 35 glaciers are predicted to disappear in the next 30 years. Similarly, 67% of glaciers in the Himalaya are retreating at an alarming rate. In the high mountains of Nepal, it is estimated that 2.45 percent of species are on the verge of extinction due to climate change (Alam and Regmi 2004). In the mountains of South Asia, tourism-focused climate change studies are rare, but a number of studies have been conducted on glacial melt and natural hazards that have significant implications for tourism development (Table 1).

<b>Types of impacts</b>	<b>Geographical region</b>	<b>Tourism implications</b>
Long - term glacier melt and retreat	Himachal, Uttaranchal and Sikkim Himalaya in India Khumbu and Langtang regions in Nepal	Visually less appealing destination Exposure to natural hazard due to glacial lake outburst and flooding (GLOF)
Seasonal wet weather	Throughout High Himalaya, most notably in Central Nepal	Periods of high snowfall triggering avalanches with loss of life and property and damage to roads and trails in surrounding areas More fuel-wood needs at higher elevations
Seasonal dry weather	Mountains in Western Nepal, Southwest China	Exposure to fire hazard Threats to endangered wildlife affecting wildlife-based tourism Loss of agricultural productivity affecting linkages between tourism and farm productions

*Table 1: Examples of climate-induced effects on mountain destinations in South Asia*

*Sources: Compiled from various sources; more subtle changes in ecotones have not been documented well.*

A more visible impact of climate change has been the rapid retreat of glaciers in the high mountains of Asia and loss of snow cover. Alam and Regmi (2004) estimate that an increase in temperature of 3-4<sup>o</sup> C could result in the loss of 60-70 percent of snow cover in the Himalaya. Loss of snow and ice cover, and melting of glacier often means expansion of glacial lakes.

In Nepal where climate change is considered a trigger for high mountain avalanches and lake outbursts, loss of life and damage to properties has been frequently observed. Nine major glacial lake outburst flooding (GLOF) were recorded between 1935 and 1985 (Nyaupane and Chhetri 2009). Vuichard and Zimmermann (1987) provided a detailed account of the outburst of the moraine-dammed lake (*Dig Tsho*) in 1985 in the Everest region which resulted in an extensive damage to tourist infrastructure and killed five people. Heavy snow during Fall 1995 caused deaths in many tourist locations, for example, 28 people were killed in Gokyo Valley in the Everest region in the avalanches of November 9 and 10. Similarly, seven people in Kanchanjunga and five in Annapurna region died because of avalanches. Similarly, landslide and debris flow of November 9 swept away houses and 15 people in Bagarchhap in Manang district. On 25 March, 2001, five individuals returning from the Annapurna Base Camp were swept away by debris flow induced by snow avalanche at Deurali.

The few examples cited above indicate the extent of damages that are likely to occur in the future. While the western world is geared to mitigate and adapt the impacts of climate change on their economies and the environments, in the developing countries the level of preparedness is less than adequate, especially in the mountains where climate change will have the most profound impact on local livelihoods dependent on agriculture and tourism. Therefore, it is essential that mitigation and adaptation measures are considered and integrated in national and local level environmental and economic policies. The following section provides an overview of some potential adaptation and mitigation strategies specific to mountain tourism destinations in Asia.

### **Adaptation Strategies in Mountain Tourism**

The tourism industry is complex and involves many stakeholders representing its various sectors, local entrepreneurs, other non-tourism agencies related to health, transportation and disaster preparedness and governmental and non-governmental entities. Because tourism transcends many aspects of the economy, it is critical that adaptation and mitigation strategies are viewed as a collaborative effort in which all critical segments of the tourism industry are included. In the context of the Nepal Himalaya, adaptation strategies must meet the livelihood needs of mountain communities.

As early as 1996, Burton (1996) had argued why the world needs to seriously consider adaptation to climate change. Firstly, climate change is unavoidable and

it is striking everywhere, regardless of the political and ecological boundaries. Secondly, anticipatory and precautionary adaptation is more effective and less costly than forced, last-minute, emergency adaptation or retrofitting. Thirdly, it is likely that climate change may be more rapid and pronounced than the current estimates. Indeed, the world has recently experienced debilitating effects of hurricanes, floods and wildfires at scales not anticipated before. These events have also exposed the vulnerability of even the most resourceful nations like the USA. Fourthly, immediate benefits may be gained from better adaptation, for example, increased investments in climate-neutral technologies can boost local economies. Fifthly, immediate benefits can also be gained by removing maladaptive policies and practices. Finally, climate change has its threats but also has opportunities. Communities that are most proactive to adapt to climate change are also likely to be primary beneficiaries of their actions.

Adaptation can be defined as “action or activities that people undertake, individually or collectively, to accommodate, cope with, or benefit from the effects of climate change, including changes in climatic variability and extremes” (Becken and Hay, 2007: 225). Adaptation encompasses adjustments in ecological, social, or economic systems in response to actual or expected climate stimuli and their effects of impacts (Smit and Pilifosova 2007). It refers to changes in processes, practices, or structures to moderate or offset potential damages or to take advantage of opportunities associated with climate change. Adaptation and mitigation measures need to be realistic, depending on local conditions, but within the framework of national and regional strategies. Economic resources, technological development, information and data base, communication and access-related infrastructure developments, institutional developments and issues of equity determine the level of adaptive capacity of a destination. Likewise, there are limits to adaptation. These include the physical/ecological limits, for example, adaptation measures will be limited if mountain tourism facilities/destinations are located at extreme environments and are severely exposed to frequent avalanches or landslides. Similarly, large scale engineering may not be possible where resources are limited. For example, snowmaking may be too costly and economically unfeasible in ski destinations in Asian mountains. In the Nepal Himalaya, adaptation limitations may come in the form of lack of viable tourism products (not enough market to sustain the type of tourism activity), lack of technology and infrastructure to support new products, and general lack of knowledge about specific sectors. There may be financial barriers imposed by insurance companies, for example, tourism destinations in hazard-prone areas will likely have to pay huge premiums for protecting their assets and may not afford the payments. For some, the barriers could be context specific and may not be applicable in a wider context, in which case, the adaptation measures will have to come from a private initiative. There are also issues of social and cultural barriers. In some cultures in Asia, climate change may be considered an act of god and thus the communities may be predisposed to accept the consequences. These communities

may consider strategies that make them resilient than adaptive. For example, when in 1995 a landslide wiped away several lodges and destroyed the main tourist trail in the village of Pahirothapla in the Annapurna region, local communities simply accepted the event as the god's punishment (based on personal observation). They quickly built new lodges and repaired the trail, and were ready for the next tourist season. Not a single resident had thought about erecting structural barriers, either individually or collectively, to prevent future landslides. Some would argue that this is an example of a community's resilience. In other cases, there could be natural limitations to adaptation. For example, adaptation to losses in wild ecosystems and biodiversity may be difficult or impossible. In the case of mountains, greatest adverse impacts will likely occur in areas with poor resource endowments, for example, if the tourism destination is dependent on a single attraction or activity, and if that is negatively affected by climate change then adaptation measures might be hard to implement.

Parry (2009) suggests that the responses to climate change will depend on the magnitude and cost of impact, the cost of mitigation, and the cost of adaptation. The most optimal strategy will carefully consider a balance of the three critical elements. While many climate scholars argue that the best form of adaptation is often a proactive "no regrets" strategy, in reality, communities and governments must weigh the benefits and costs of adaptation. Community responses might often be influenced by psychological factors. Keeping these factors in mind, a hypothetical scenario in the implementation of adaptation and mitigation measures is illustrated in Figure 2. The propensity to respond to climate change by individuals or at the community level will be high if anticipated benefits from adaptation will exceed the risks associated with climate change

(*Equilibrium + 1*). In the event of a high-risk situation (*Equilibrium - 1*), individuals may simply become fatalistic. While in big tourism destinations, this scenario might not work, it nevertheless illustrates who amongst the tourism stakeholders may respond to or will lend support to adaptation measures initiated locally.

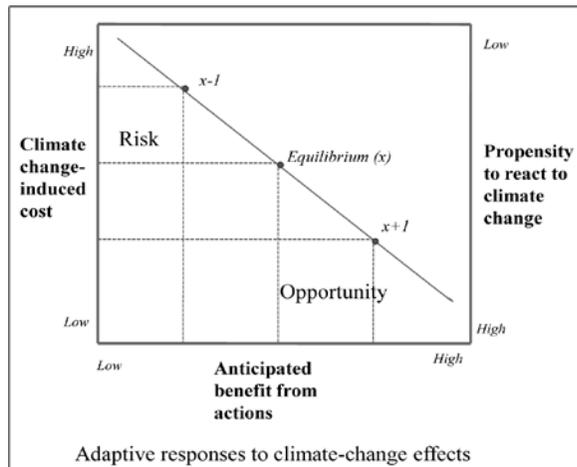


Figure 2: Adaptive responses to climate change effects in mountain tourism

Adaptation and mitigation strategies in the tourism sector can occur at several levels, starting with private entrepreneurs to resident communities and governmental and non-governmental entities at local, state and national levels. For the business sector, adaptation implies maximization of range of economic opportunities available. While some “niche” products or attractions could be lost due to climate change, newer opportunities and alternatives could become available. For example, in the ski sector, lack of snow has forced some ski-resort operators to adapt to non-ski activities, thus presenting opportunities for extending the non-ski market. Newer ski resorts are built as four-season playgrounds with a combination of ski, mountain biking, hiking and other types of recreational opportunities. From the perspective of resident communities at tourism destinations, incentives to adopt climate or carbon-neutral technologies are viable options as adaptive strategies. Similarly, at the government level, policies on incentives and disincentives to facilitate adaptation strategies by the tourism industry need to be developed and integrated as part of the state and national environmental strategies on climate change. In the Nepalese context, environmentally friendly forms of tourism including ecotourism and adventure tourism which have a smaller ecological footprint locally (but not necessarily at the global level) should naturally be preferred over other commercial forms of tourism. During the author’s most recent visit to Shimla, interactions with the local government officials and tourism policy makers indicated their strong desire to pursue the development of ecotourism and other pro-environmental tourism activities. This, they argued, is the best course of action given the broader and long-term implications of climate change on mountain communities in the Indian Himalaya.

Concrete examples of adaptation strategies in mountain tourism destinations in Asia are hard to find and that is primarily because the tourism sector has not really considered the direct threats from climate change. Figure 3 shows adaptation strategies that could be applied to ski destinations. In general, many mountain tourism destinations in Asia have shifted away from relying on fossil fuel-based energy sources to green technologies, for example, on the main tourist trails of the Annapurna and Everest regions the adoption of solar technologies is now widespread (Nepal 2008). Similar observations were noted during the author’s recent trips to Southwest China. However, for mega tourism projects such as the Qinghai-Tibet railway on the Tibetan Plateau at an altitude of 13,000 ft, risk assessments need to be carefully considered. The railway lines are built on permafrost zone; warming trends on the Tibetan Plateau would certainly make the lines unstable and would cost huge amounts of money on annual repairs and maintenance. While not directly related to tourism, in the Langtang National Park of Nepal, threat of GLOF from the dammed *Tsho Rolpa* glacier has been reduced to a lower level because of measures such as draining the lake and putting in place early warning systems in downstream villages (news.nationalgeographic.com). The total cost of these adaptation measures was \$3.2 million, indicating that the cost of some adaptation

measures will be very high. What Figure 3 implies is that a range of opportunities should be tapped and series of adjustments must be made if one were to adapt to climatic influences on tourism demand and destination characteristics. In the Nepal Himalaya, it might mean identifying and developing niche tourism products and destinations that will take advantage of climate adaptations. For example, it may require incorporating better environmental practices at the firm (enterprise) and destination levels and developing carbon-neutral services and products at the destination.

Specific adaptation measures can be implemented for different types of tourism activities and overall changes in the tourism infrastructure. Many tourist destinations around the world are building facilities such as ice rinks and indoor spas as alternatives to natural experiences. Similarly, green technologies have been incorporated in the physical planning and building design of tourist facilities. Adaptation in business practices is also emerging, for example, the development of marketing alternatives to cope with either a shrinking or expanding market (Mather et al 2005). Governments will have to develop adaptation measures specific to vulnerabilities associated with tourist health issues like SARS. While the above examples are not very suitable to Nepal, the identification, determination, and development of alternative tourism products should be part of national level policies. There is no guarantee what has worked in the past (e.g., portraits of scenic, snow-capped, majestic mountains as part of the tourism marketing policy) will continue to work in the future. Therefore, there needs to be a focused marketing strategy in how to portray mountain tourism destinations in the context of climate change.

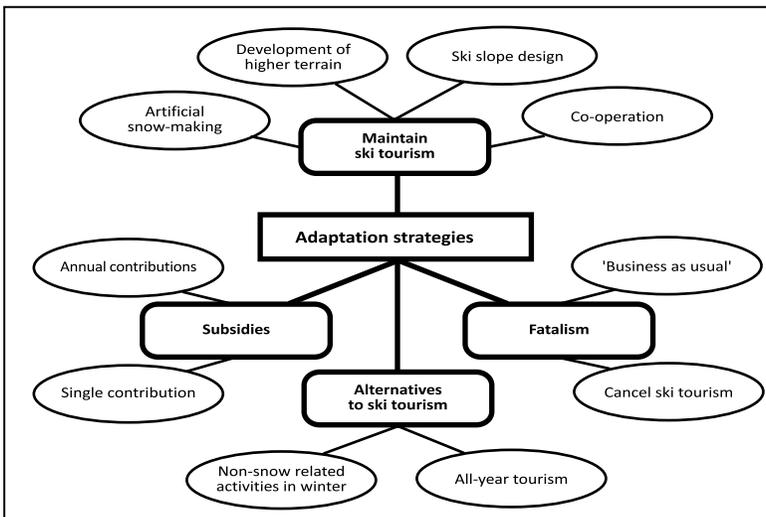


Figure 3: Adaptation strategies in ski resorts

Source: Elsasser and Bürki 2002: 256

## **Strategies for Adaptation**

Overall, potential local adaptations in mountain tourism include sharing losses, modifying threats, preventing or decreasing effects, changing use, and changing location. This implies that adaptation measures need to be grounded in reality and practical. At the national level policy issues become more important.

### ***Local level adaptation:***

Practical examples of local level adaptive responses would include locating new tourist facilities or relocating old facilities to low-risk areas. Through various protection measures (for example, on steep locations and high snowfall areas), the risks to tourism assets and operations can be reduced. Mountain tourism destinations must develop their capacity to respond to sudden catastrophic events and disasters, for example, by installing early warning systems and search and rescue stations, and they must be able to quickly adapt to rapidly changing ground conditions. Building codes and engineering design standards must be enforced to reduce damages due to hazards. Relief and insurance mechanisms are necessary to spread the burden and to support recovery and reconstruction. Preservation of buffer forests, parks, and other protective land use features is equally important to reduce underlying exposure and vulnerability (Travis 2009). In the event of inaction, tourism destinations will suffer from ecological, economic and social disruptions. The areas where mountain destinations need to strengthen include:

- 1) Establishment of social institutions and arrangements to tackle climate-related effects; the arrangements need to consider representativeness of decision-making bodies.
- 2) Encourage diversification of employment and income sources in the mountains; this is critical in the event of a collapse of the local tourism industry. Critical linkages must be built between tourism and other economic sectors like agriculture.
- 3) Formal and informal arrangements must be made for collective security against the effects of climate change. This means private and public entities need to build support mechanisms at the local level.
- 4) Identification and prioritization of local adaptation measures, based on adequate provision of knowledge, technology, policy and financial support.

### ***National and regional level climate adaptation in Nepal must be based on policies that are :***

- 1) Strengthening and creating an enabling environment for adaptation of tourism sector
- 2) Diversifying tourism products and services
- 3) Disaster management and adaptive responses in tourism training curricula

- 4) Gearing towards poverty reduction
- 5) Establishing monitoring and communication systems
- 6) Encouraging local or community level adaptation and in the private sector
- 7) Pursuing sustainable economic growth
- 8) Linking tourism livelihood to climate influences

## Conclusions

There is a general lack of awareness among climate change scientists about the potential impact of climate change on the tourism industry. Tourism scholars have begun to address issues concerning tourism and climate change relationship. Climate and its impacts on the tourism industry have been discussed mostly in the context of the developed world. However very little research has been conducted in the developing world, and, particularly in the context of mountain destinations.

Given the specific characteristics of the mountains, it appears that mountain tourism destinations are more vulnerable to climate change and more so in areas of high mountain communities such as those in Nepal. Evidence of the effects of climate change on mountain destinations are slowly emerging, especially in the context of natural hazards such as disappearing or retreating glaciers, glacier-induced flooding, landslides and avalanches. More subtle changes in the natural areas of high mountains are hard to document and take time, therefore the long-term impacts of these on the tourism industry is uncertain. As Figure 2 implies, the nexus between climate, tourism and livelihood for the mountain communities can be complex, and therefore requires concerted research efforts in documenting the ways in which climate is going to impact the mountain communities and their livelihood prospects. The impact of climate change and adaptation measures will vary depending on local conditions but broad-based adaptation measures need to be developed and integrated as part of the climate policy at national level. Mountain tourism destinations in Nepal must develop their capacity to diversify their tourism opportunities, discourage development of tourism facilities in risk-prone zones, protective barriers need to be built where facilities have been already built, early warning systems, and search and rescue stations need to be established. These actions need to be considered as a collaborative effort between various players in the tourism industry. Further research on location-specific threats of climate change should be conducted in order to develop specific actions, but these actions must be considered a part of a comprehensive package “climate ready” policy, both at a local and national level.

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