

- Masters Thesis in Water Resources and Coastal Management -

High Mountain Melt-Down: Local Perceptions of Global Warming in the Andes and Himalayas



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Spring Semester 2008
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Abstract

Present scientific knowledge about global warming affirms that ice and snow packs in the high mountains of the world are melting at increasing rates (see IPCC 2007 and UNEP 2007). Melting glaciers and receding snowlines jeopardize seasonal stream and river systems in arid regions of the world and threaten the livelihood of farmers who utilize the meltwater for irrigation. This study contrasts two case studies in the Himalayas of Nepal and the Central Andes of Perú to gauge the impacts of these changes. The perceptions of these agriculturalists are the central focus of the analysis, first to determine the extent and trajectory of changes in the local cryo-hydrological regime, second, to discover the local meanings of such changes, and third, to compare the distinct cultural discourses that emerge from similar geo-physical situations. Villagers from Lumbuk Canyon, in Mustang, Nepal and from the Colca Valley in southern Perú have perceived definite changes in local climatic patterns and a noticeable decrease in mountain snow and ice. The effects of the changes are myriad and colored by local cultural interpretations and myths, as well as by ‘external’, ‘modern’ knowledge. The discourses on the meaning of and necessary responses to cryo-hydrological changes reveal a competition and at times a conflation of local and ‘modern’ ways of seeing. It is important that the discourse of modern development not overwhelm and eclipse local perceptions of this global problem. Only by recovering these narratives can we fully understand the impacts or hope for possible local solutions rooted in traditional knowledge.

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Acknowledgements

This thesis has required more energy from me than any other project I have completed so far. Without the help of so many people, it never would have been accomplished. First, I am indebted to the University of Bergen and the Institute of Biology for funding my research in Nepal, and for the Institute of Geography for taking me under its wing. I would never have made the decision to conduct a comparison of the world's two highest mountain ranges had I not received generous help from BKK and the scholarship they provided me. I thank my supervisor, Tor H. Aase, who has inspired and supported me the whole way on this long, rocky road. To everyone at Tribhuvan University, namely Dr. Ram Chaudhary, who welcomed me on my arrival to Nepal and the Himalayas. To Mr. Lal Prasad Gurung, head of Annapurna Conservation Area Project who kindly helped me obtain my research permit under strained circumstances. To Dr. José Rivera from the University of New Mexico, without whom I never would have come into contact with 1) Luis Pablo Martínez who taught me how to read the 'water landscape', and 2) Dr. María Teresa Oré from the Pontificia Universidad Católica del Perú in Lima who welcomed me warmly to the Andes. To the villagers of Mustang and the Colca Valley who made me their guest and made me feel at home, and at times like an 'insider'! Thank you for sharing your amazing stories and knowledge, presented in this thesis. To my interpreters and now good friends in Mustang, without whom communication in the Trans-Himalaya would have been impossible: Rinzin Namgyal, Dara Gurung, Laxmi Gurung, and Dolker Gurung. Also to Ongjuk Gurung from Dhakarjhong who kindly cleared a bed for me in his home, for which I am forever grateful. In Cabanaconde, I thank Don Paulino Junco, maverick and renegade hostel owner whose stories and knowledge are to remember and be inspired by for the ages.

And finally, to my friends and loved ones who have been the most crucial part of this process for me. To my parents for guidance (and editing-thanks Dad!), Romy for companionship and collaboration in the field, Carlos and Ingelinn for amazing cartographical expertise, Dilli and Hemanta for momos in Jomsom, to the rest of my family and friends who have encouraged and supported me. And last but not least, to my boots for carrying my feet to all these far-off corners of the world! ¡Mil gracias!

Bergen, Norway – 25 June 2008

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PART I: INTRODUCTION

“Civilization has been a permanent dialogue between human beings and water.”
-Paolo Lugari



Photo 1 Dhakarjhong *tsingu*

Chapter 1: Water on the Roof of the World

1.1 High Mountain Melt-Down: the Himalayan and Andean Dilemmas

The common denominator of this thesis and arguably for the whole of humanity and the rest of life on earth, is water. Water plays a central, elemental role in all the geo-physical, biological, and social processes that define our world: everything from glaciation and the erosion of mountains and canyons, to irrigated agriculture and the most intimate of human relations. From raindrops to tears, it penetrates the air we breathe and permeates our very flesh. The stewardship of freshwater is the single most important factor for human habitation, whether in the great valleys where civilization was born, or in the uplands and arid margins of its periphery. From Karl Wittfogel's hydraulic hypothesis on the emergence of state authority (Wittfogel, 1957, Paerregaard, 1994) to more recent studies on localized community-based management (Lansing, 1987), the control of water has been recognized as the cornerstone of civilization. Throughout history, entire societies have declined or even collapsed from the disruption of supply or failure in water management¹.

For this comparative study I have chosen two desert highland communities in proximity to both the highest mountains and the deepest canyons on earth, Nepal's Kali Gandaki Gorge in the district of Mustang and Perú's *Cañón del Colca* (Colca Canyon). Both are mountain dwelling, meltwater dependent agro-pastoralist societies. Both have persevered under the harshest of conditions for many centuries if not millennia. But today, climate change and accelerated global warming threaten to disrupt the climatic, environmental, and hydrological regimes of the world on a scale unseen in human history. If warming exacerbated by greenhouse emissions continues throughout the 21st century, the equilibrium of the human-water-environment nexus will be increasingly precarious. In a planetary scenario, the small-scale irrigation societies like those in Nepal and Perú must no longer be seen as marginal, but rather in the vanguard of human adaptation, with a millennial store of traditional environmental knowledge and practice as cultures of habitat (Nabhan, 1997).

¹ See, for example de Menocal (2001) on late Holocene climate change and the collapse of the Akkadian (ca. 4200 calendar yr B.P.), Classic Maya (ca. 1200 calendar yr B.P.), Mochica (ca. 1500 calendar yr B.P.), and Tiwanaku (ca. 1000 calendar yr B.P.) empires.

In terms of scale, what *local* effects are emerging as a result of *global* warming? As a global event, widespread climate change and warming are sure to affect local people in profound ways, but it is difficult to predict the impacts without first assessing how these people perceive of and understand these changes. What do they see as their options regarding survival or adaptation? Many scholars suggest that research on cultural adaptation and changing awareness of resource dependent communities will provide insight and understanding of human responses to the challenges world wide (Vedwan and Rhoades, 2001).

The goal of this thesis is to link global changes and local effects through the perceptions of local peoples in small-scale, mountain irrigation societies whose water supply is currently dominated by melting snow and ice from local glaciers. What changes have they seen? What causes do they attribute them to? What are their hopes and fears for the future? How do they think they will persevere as their ancestors did? Field studies with the Southern Loba villagers of the Trans-Himalaya, and the Collagua and Cavana villagers of the tropical Andes will allow me to identify common themes and a deeper understanding of their relationship with their environment, their perceptions of global warming, and the implications for adaptation and survival. These stewards of the world's highest headwaters see themselves in a deepening crisis. The implications for all the peoples living downstream are imminent.

1.2 Rationale for the study

1.2.1 The geo-physical basis for study

The Intergovernmental Panel on Climate Change's (2007) fourth assessment report, "Climate Change 2007" presents alarming evidence that the world's snow and glacier-fed freshwater resources are under ever-increasing stress as global warming becomes more pronounced. The report explains:

On a regional scale, mountain snowpack, glaciers and small ice caps play a crucial role in fresh water availability. Widespread mass losses from glaciers and reductions in snow cover over recent decades are projected to accelerate throughout the 21st century, reducing water availability...and changing seasonality of flows in regions supplied by meltwater from major mountain

ranges (e.g. Hindu-Kush, Himalaya, Andes), where more than one-sixth of the world population currently lives. (IPCC, 2007)

In reference to evidence from the highlands of South America, Bradley et al. (2006) reports that “temperatures will rise more in the high mountains than at lower elevations”, exacerbating an already dire scenario for “regions where water supply is currently dominated by melting snow or ice” (Barnett et al., 2005). In arid and semi-arid areas dependent on mountain snow and ice-melt, such as Mustang and the Colca region, the situation is especially problematic due to already endemic water scarcity. Increasing temperatures in mountain regions will cause glaciers to recede and snowpack to diminish, depleting this essential reserve of freshwater.

Viviroli et al. (2003) emphasize the hydrological importance of mountains by characterizing them as “wet islands”. Moreover, “their significance increases in proportion to the size of their glaciers and the durability and volume of snow cover, which acts as a reservoir for the dry season,” this of course holding true for semi-arid and arid areas that *have* a marked dry season. Some are perennially dry, without any season you could refer to as *wet*, such as in Mustang. They add that mountains perform an especially crucial role in the hydrology of arid and semi-arid areas because they yield a “mean proportion of discharge [of] 70%, whereas the mean proportion of total mountain area is [only] 33%.” This means that mountains contribute *over double* (2.12x) the amount of freshwater to discharge relative to the area they cover. These facts underscore the hydrological importance of mountains world wide, from the Andes to Zanskar, as the ‘storage tanks’ or ‘water towers’ of the world. In arid regions and for land-based peoples, they have even greater significance. With the acceleration of global climatic change and warming, the threat of melting of mountain snow and ice is becoming greater. This in turn will adversely affect land based, resource dependent peoples like the mountain-dwelling agro-pastoralists of Mustang and the Colca Valley (as I will refer to the area of the Canyon inhabited by these agro-pastoral communities), as well as many others around the world for whom mountain meltwater is their most precious resource.

1.2.2 The social basis for study

From the above evidence there is little doubt that melting mountain ice and snow will affect resource dependent people. For conceptual purposes only, we can thus construct a causal

chain of events connecting this bio-physical process with humans in, broadly, the developing world²: the depletion of mountain snow and ice, over time, will cause an increase in water scarcity, or at least a less reliable, more highly fluctuating supply of water. If rural communities do not have the capacity to adapt to these changes, then out-migration will be a likely result. These displaced people, or ‘climate refugees’, will then increase pressure on other places, which if lacking the resources to aid the refugees will increase the level of crisis. We can refer to this causal chain the ‘melt-down narrative’.

However other theories about physical processes and their human causes and impacts have been constructed before. Over 20 years ago, a theory about environmental change in the Himalaya due to increasing human pressures on natural resources emerged. The Theory of Himalayan Environmental Degradation (THED) (Ives and Messerli, 1989) is the grandfather of theories aiming to explain the widespread impacts of environmental disturbance and change in the Himalaya and other mountain regions experiencing increasing pressures from growing human population, including intensification of land use, deforestation, etc. Explicitly, the theory describes how, in the interest of survival, a rapidly burgeoning rural population in the Himalayan foothills would lead to total environmental degradation due to an alleged chain of events. It supposes that rural villagers in need of fuel wood would clear-cut forested hill and mountain flanks and later convert the cleared land into terraced agricultural fields, destabilizing topsoil on the steep slopes. Because of the destabilization, erosion on a massive scale would occur, triggered by monsoon rains. The theory concludes that the displacement of unfathomable amounts of soil onto the Gangetic Plain, one of the most densely populated areas on earth, would result in catastrophic flooding, destruction of livelihoods and loss of life.

However, the main pitfall of THED proved to be its oversimplification of the complex dynamics of physical and biological systems and their processes in connection with human activities. Moreover, the land-based peasants living in the mountains were blamed for suspected environmental cataclysms without substantial proof that they were actually causing harm (Thompson et al., 2007). Some studies proved that human activities and traditional

² Here the ‘developing world’ is utilized to characterize places with high vulnerability to climatic change, catastrophic climatic and other bio-physical related events (i.e. crop failure, flooding, GLOF’s, etc..) due to the predominance of a rural population, developing infrastructure, and any other factor that has an effect on the ability to absorb the ‘shock’ of such an event (i.e. access to resources, working infrastructure to distribute aid, government response ability and adequate funding of disaster relief, etc.)

environmental knowledge of slope stabilization actually conserved soil and prevented large-scale erosion of the lands their livelihoods depend on (see Thompson 1995 and Gurung 2007). The problem with such macro models as THED is their minimization small-scale solutions in the interest of achieving greater overall shock value. In the end a blurred or perhaps idealized image of reality results, depending on who is depicting it. Although the generation of rational explanatory chains for environmental change is important for development, relief work, disaster prevention and management, etc., these theories are often disproved or refuted by overwhelming counter evidence. Forsyth (1998) and a whole movement of scientists inquiring about the nature of biophysical processes argue that “‘hybrid’ research combining social and natural science...[is] essential in order to avoid accepting environmental ‘myths’ uncritically”.

Thus when the human element is introduced into models of geophysical processes, we become increasingly aware of the uncertainties that plague human-environment studies (see Thompson 2007). As van Spengen puts forth to enlighten us in regards to human-environment studies, “[we] think we know, but at the same time realize that not all things are as yet fully understood, or indeed knowable. In addition, there are many ways of knowing” (van Spengen, 2004).

At the unfolding of a new theory of regional and global environmental change—global warming and climate change—it is crucial to take the time to research the human role in it, from the perspective of the humans it most directly affects; to study the *local* effects of *global* climate change and warming through the eyes of the people witnessing the event in their own mountain environment, because their perceptions and indigenous environmental knowledge are in essence a barometer of changes that will have implications for their adaptive capacity.

1.3 Research Questions

In regards to the above arguments provided, we have a clear rationale for this study, whose aim is to answer the following research questions:

1. How do the mountain dwelling meltwater dependent peoples of the cases of Mustang, Nepal and the Colca Valley, Perú perceive of environmental and

climatic changes as affects their water resources in the present context of global warming and climate change?

Michael Thompson (1995), partially in reaction to THED, has proposed that we approach environmental disaster narratives critically through the analysis of people's perceptions. Through his Cultural Theory (Thompson et al., 1990), we can analyze perceptions of environmental uncertainty with his cultural typology in order to better understand the different cultural constructions of cryo-hydrological change in these local contexts. Thus we can ask a theoretical question in addition to the first question:

How can Thompson's Cultural Theory and his idea of the 'myths of nature' aid our understanding of how the perceptions of agro-pastoralists are constructed, in order to understand their reactions to adversities posed by cryo-hydrological change?

The second principle research question of this thesis is the following:

2. How does the comparison of the cases of Mustang and the Colca Valley help increase our understanding of the common effects of cryo-hydrological change in a cross-cultural context? What insight can this give into our understanding of the varying patterns in peoples' responses to this global event? Or in other words, what does this comparison bring to light what a single case alone would not?

With the goal of comparison, this inquiry thus also lends itself to a deeper theoretical probing based on ideas of Julian Steward's (1955) ideas of the *cultural core*. Thus,

What does the comparison of Mustang and the Colca Valley reveal regarding Steward's cultural core concept?

Thus, these two empirical questions and two theoretical questions frame the goal that this thesis sets out to reach.

1.4 Summary

The general purpose of this thesis is to understand the social construction of global events (climate change and global warming) in a local context through people's perceptions. Bound by the limits of the natural environment, people's responses to environmental and climatic events provide culturally constructed information on how these changes are occurring and what it means for them. To address this, and to answer the questions posed above, I will provide the geographical and socio-cultural contexts of each case to provide a portrait of the complex relations defining Mustang and the Colca Canyon. In the theoretical discussion, I will present various different viewpoints that describe how people's perceptions of the environment inform us about the complexities of the human-environment relationship. In the chapter on methodology, I will show how I applied qualitative field methods to collect informants' perceptions, and the challenges encountered in the field that circumscribe the scope and implications of this inquiry. In the results, I will present their perceptions of changes of climate and water resources, and their ability to adapt in the past, present and future. In the analysis, I will categorize and determine how perceptions of change and adaptation are constituted. For the discussion I will contrast the results in Nepal and Perú to seek a global overview of the dilemmas at hand.



Photo 2 *Ayni* shared labor in Tapay, Colca Valley, plowing the earth with *chakitaqlla*



Photo 3 *Lengyi* collective labor in Dhakarjhong, Mustang cleaning the *tsingu* of debris

Chapter 2: Setting

2.1 Glaciers and Meltwater Irrigation from *Shangri La* to *El Dorado*

Mustang, Nepal, and the Colca Valley, Perú, are regarded by the first Western explorers who ‘discovered’ or ‘conquered’ them as mystical and mysterious, forgotten or lost, forbidden and ancient with the same mythology and romanticism as the infamous *Shangri La* and *El Dorado* are described. Michel Peissel, an anthropologist-adventurer was one of the first modern Western explorers to travel deep into Mustang on an expedition in 1964. In his ethno-travelogue, *Mustang: A Lost Tibetan Kingdom*, he writes:

...to the south all Mustang lay at my feet...I could not help but feel that I had reached one of the fabled edges of the world feared by the mediaeval travelers, where the universe ends, a place unique in its remote isolation, one of the poles of our planet... I contemplated this wild and grandiose scene that I had conquered... (see Peissel, 1968: 215-216)

His characterization of Mustang, on the edge of the Tibetan Plateau as one of the earth’s ‘poles’ would be repeated by future Himalayanists who have labeled these mountains and Tibet as the ‘third pole’, since it is only surpassed by the Arctic and Antarctic in the extent of its glacier cover.

The first Westerners to arrive to the Colca Valley were the Spanish after the Conquest of Perú in 1532. After fading into the ages of the Spanish colonial period, it was ‘rediscovered’ four centuries later during airplane expeditions from 1928-1930 by George Johnson and Robert Shippee (see Shippee, 1932 and 1934). The ‘lost’ or ‘forgotten’ valley was effectively reclaimed for the popular Western imagination and science, and has since become a focal point of research and tourism since the 1970’s. From a glaciological perspective, the tropical Andes, including the region surrounding the Colca Valley, are no less impressive than the Himalayas, owing that they harbor most of the world’s tropical glaciers.

Thus it comes as no surprise that both Mustang and the Colca Valley attract attention from a wide variety of adventurers, scientists, and today tourists. Their high snow capped peaks and

deep gorges inspire awe and defy the imagination. But their rich cultural landscapes are probably their most extraordinary feature. Agricultural terraces cling to steep slopes high on mountain flanks, and gravity irrigation systems are carved into the steep, harsh, arid mountain terrain, channeling glacial meltwater to fields far below. The people who constructed these systems are equally as intriguing for what they can teach the world about survival and adaptation in such extreme and variable conditions. Some estimates suggest that irrigated agriculture has been practiced in Mustang for upwards of three thousand years (see Knörzer, 2005) and in the Colca region for more than fifteen centuries (Sandor, 1995). This is telling of the perseverance of these mountain agro-pastoral cultures and also the relative stability of the mountain meltwater from the high Himalayas and Andean peaks above. Although the two study areas are a world apart, they share these and many other similarities which are of key interest for this study.

2.2 Choice of Study Areas

Mustang and the Colca Valley are emblematic of human survival and the mastery of water, however, they find themselves today in a context of global environmental change. One sixth of the human race depends on meltwater from the Himalayas and the Andes, and a large proportion of their inhabitants are farmers³, thus research is needed to assess how these land based peoples perceive of their changing water resources today (see Dessai et al., 1999). Since much focus and attention vis-à-vis melting ice and snow traces the retreat of large and famous glaciers such as the Gangotri glacier in India and Quelccaya ice cap in Perú, a much bigger problem is obscured. Thousands of smaller, lower altitude systems of accumulated mountain snow and ice are also affected, along with the multitudes of communities associated with them.

To address this problem, I chose from micro-watersheds connected hydrologically to peaks not in excess of 6,025 meters above sea level (masl) on two continents. These watersheds, furthermore, are essentially on the *margins* of snow and ice accumulation. If significant melting is occurring on these secondary mountain peaks due to global warming, the people dependent on the snow and ice-melt are likely to notice, and could be at risk of depletion sooner than watersheds where mountains are higher and snow and ice is more plentiful.

³ In Nepal, roughly 8.5 million people or 76% of its labor force work in agriculture, while in Perú roughly 850,000 people or 9% of its labor force are directly employed by agriculture (CIA World Fact Book, 2008).

My fieldwork was carried out in two sites: Mustang, Nepal, from April to June 2007, and in the Colca Valley, Perú in January 2008.

2.3 Introduction to Mustang

Mustang (see Figure 2.1) is one of 75 districts in the Himalayan nation of Nepal. It is located between Manang district to the east and Dolpo district to the west. Nepali districts are divided into a number of 'Village Development Committees' or VDC's, representing the Nepali state within otherwise very autonomous mountain communities. The VDC's manage matters of the Nepali state and today are the pathway for soliciting development funding in the villages of Mustang. The other important administrative unit of Mustang today is the Annapurna Conservation Area Project (ACAP), one of Nepal's national parks. Its goals are to conserve the environment and ecology of the diverse Annapurna massif, promote mountain tourism, and support sustainable development and economic activities in the rural communities that fall under its borders. The Conservation Area Management Committee (CAMC) is the village level administrative body of ACAP, modeled after the VDC, which is responsible for sustainable development in the villages, as well as providing another pipeline for development funding in the villages.

Mustang, in the physical sense, is located in the west-central part of Nepal on the Tibetan (Chinese) border in the 'Trans-Himalaya' or 'Trans-Himalayan belt'. This geographic region is on the northern slope of the Great Himalayan Range on the edge of the Tibetan Plateau, stretching from Ladakh in Northern India east to Bhutan. As the name suggests, it is 'beyond' the Himalayan crest and is the transition zone between the mountains and the high Tibetan Plateau. It is windswept, with an arid mountain climate resulting from the extreme rainshadow that the high peaks to the south create. The massifs nearest to Mustang are the Annapurna and Dhaulagiri ranges, which tower to 8,091 m (Annapurna I) and 8,167 m (Dhaulagiri I), respectively. From the ground the stark rainshadow is visible over a very short distance. Just 5-10 km south of Jomsom, the administrative capital of Mustang, there are plentiful pine forests covering the mountain flanks rising above the Kali Gandaki River. But only a few kilometers north of the village, and where I carried out this study, vegetation is sparse with only intermittent junipers (*Juniperus spp.*), wild rose bushes, grasses and a type of

Mustang District, Nepal

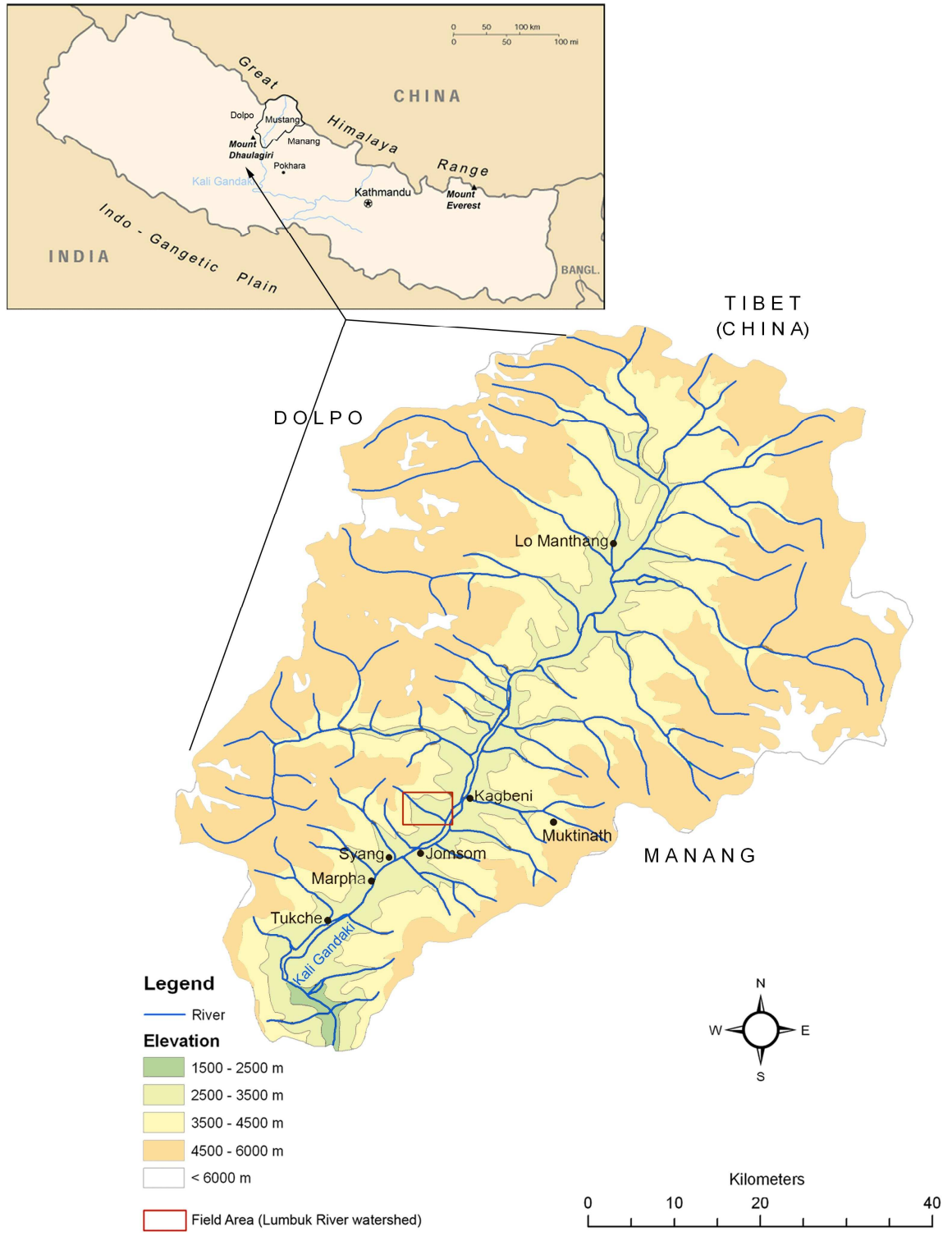


Figure 2.1 District map of Mustang with adjacent Trans-Himalayan districts and Tibet

low thorn shrub. Precipitation averages between 200-300 mm annually⁴ here, imposing important constraints on agriculture, which here is entirely dependent on irrigation. The majority of precipitation falls as snow in the winter months, so the mountains serve as important reservoirs of water during the spring and summer irrigating seasons. Just 65 kilometers to the southeast of the Jomsom area is the rainiest place in Nepal on the moist southern foot of the Annapurna massif, the city of Pokhara where it rains more than 4 meters annually (Government_of_Nepal_Meteorological_Forecasting_Division, 2006). This is testament to the control the Himalayas have on climatic conditions in the region, and so the problem environment poses for the agro-pastoralists of Mustang.

The Kali Gandaki River is a major geographical feature in Mustang. It bisects the whole district stretching from the cold, high passes on the Tibetan border southward through its gorge that separates the Dhaulagiri and Annapurna ranges. Floodplain terraces and alluvial fans from side valleys protrude into the Kali Gandaki's broad riverbed, restricting it at points. These elevated platforms of gently sloping land provide ideal terrain for agriculture and settlement, almost all of which are utilized in this way.

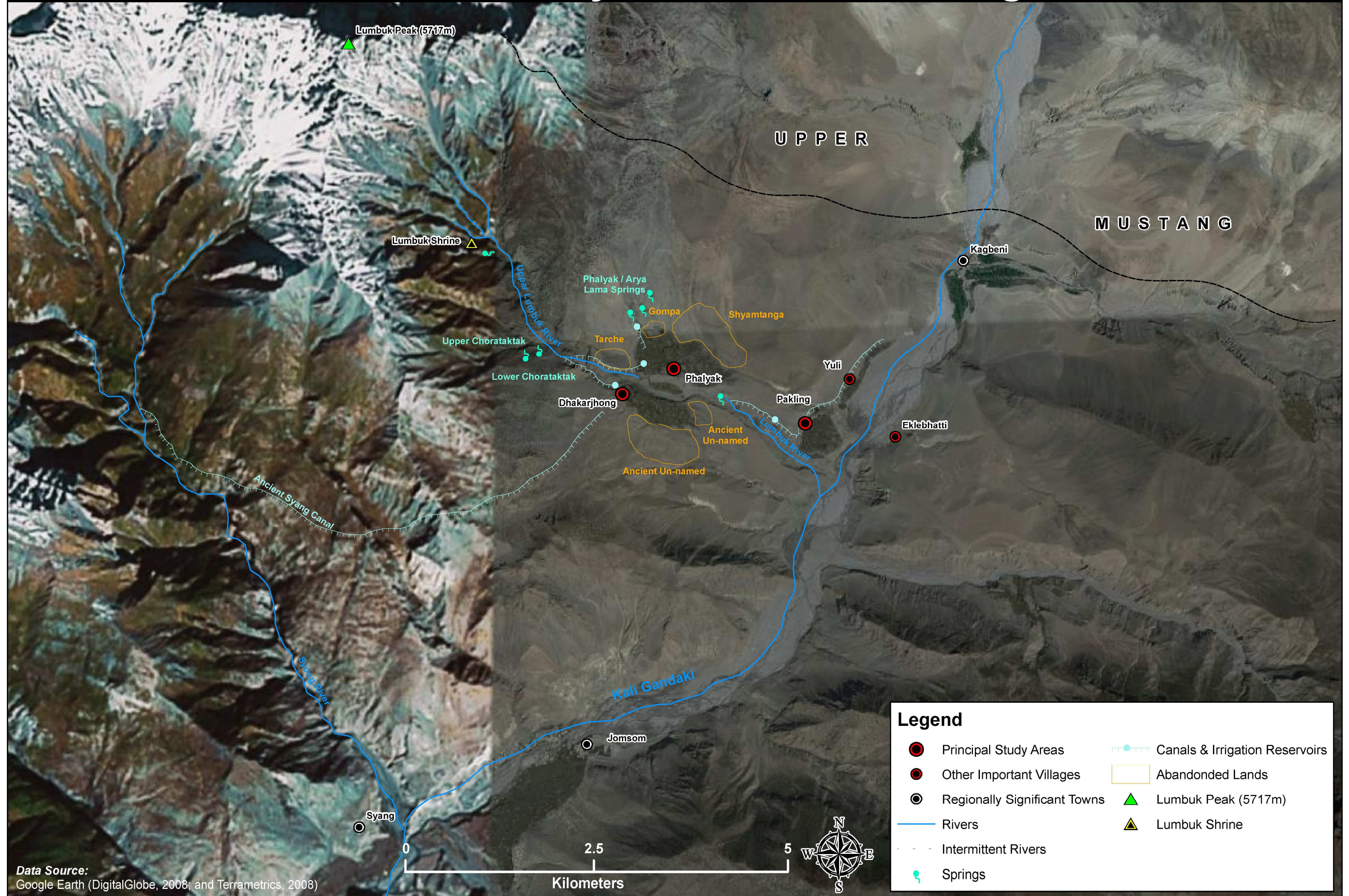
The villages of Phalyak, Dhakarjhong and Pakling (see Figure 2.2), all featured in this study are situated in a micro-watershed on one of these alluvial fans. Here, the Lumbuk River carves a small canyon through the fan which spreads out at the base of a mountain of the same name before draining into the Kali Gandaki. The stream runs roughly 7 kilometers and is fed by meltwater and occasional rainfall runoff captured in Lumbuk Mountain, whose highest point is a mere 5,717 masl—relatively low compared to the towering 6,000 to 8,000 meter-high peaks nearby. I observed snow only in the most protected, northeast-facing corners of the mountain's jagged ridgeline.

The people of the Lumbuk villages are culturally Tibetan, speaking a Tibetan dialect referred to as *bhote* in Nepali⁵. Many villagers also used this term for their language, unaware of any other name for it. Before the arrival to Buddhism in the 11th-12th centuries, people practiced the indigenous animistic religion of the Himalayas and Tibetan Plateau, known as Bon

⁴ Average precipitation from 1973-2000 has been measured at just 253.1 mm per annum (Government of Nepal Meteorological Forecasting Division, 2006)

⁵ 'Bod' is the Tibetan word for Tibet, and *bhote* is a Nepali derivation of this. It used to refer both to the Tibetan peoples (including those of the border regions of Nepal, like Mustang) and their language. The term sometimes has a negative, derogatory connotation implying 'provincial' or 'uncouth'

Detail of Lumbuk Canyon with Surrounding Areas



Data Source:
Google Earth (DigitalGlobe, 2008; and Terrametrics, 2008)

Figure 2.2 Detail map of Lumbuk Canyon

(Gurung et al., 2004). Today, the village of Lupra, opposite the Kali Gandaki from Lumbuk Canyon, still maintains a Bon monastery. Locals also still remember the old religion through stories, namely how the villagers used to sacrifice animals for precipitation to their gods. When Buddhism supplanted this original cosmology, *ahimsa* or non-violence toward beings abolished sacrifice. Today, they are devout Tibetan Buddhists of the *Nyingmapa* and *Sakyapa* sects. Locally, the villagers revere a *Nyingmapa* saint named ‘Guru Rimboche’⁶ or ‘Padmasambhava’, the father of Buddhism in Tibet. He is said to have meditated in a cave called Lumbuk which is today a holy site for the villages (see Figure 2.2). It is so special for them in fact that they go on a few-kilometers-long pilgrimage on auspicious days in the Tibetan calendrical cycle to the site. The pilgrimages are made for various reasons, if not just for spiritual merit, which one can never have enough of. It is said that it will rain after a pilgrimage invariably, simply as a result of this devotional act. Many stories of this heroic patron saint of Lumbuk are told, including how he made Dhakarjhung suitable for human habitation (see Appendix C).

Historically, the villagers of Lumbuk Canyon are related to the Kingdom of Lo immediately bordering Tibet. The villages are located on the kingdom’s southern border. Lo is a small vassal kingdom of Nepal which was subsumed into the Himalayan country in the mid 18th century (Gurung et al., 2004). Because of these cultural and historical connections, the people of Lumbuk Canyon are also referred to as Southern Lobas. The Lumbuk villages are considered part of a larger grouping of settlements in the area called *Baragaon* (Nepali for ‘twelve villages’ although there are several more than this), marking the border between Lower and Upper Mustang. While Upper Mustang consists of Lo, Lower Mustang includes settlements of the Thakali ethnic group which has had a significant influence on the shaping of the socio-economic history of the Kali Gandaki valley. One of these ways was through their domination of the historic Tibetan salt trading route along the Kali Gandaki from Tibet to the Gangetic Plain. Certain individuals amongst the Thakalis were awarded trading privileges by the Nepali king, and these *subbhas* came to dominate in the affairs of even the Lumbuk villages, sometimes forcing the villagers to pay tribute⁷. The deeds and misdeeds of

⁶ This is an approximation of the local pronunciation. The conventionally spelling of the saint’s name is ‘Guru Rinpoche’

⁷ Throughout the history of Mustang, as with many transverse valleys in the Himalayas, the Kali Gandaki has been an important trade route between the Tibetan Plateau and the Indo-Nepali plains to the south of the Himalaya (Haffner and Pohle, 1993). Traditionally salt was the major commodity mined in the Tibetan lakes and transported by mule and yak to market places in Nepal and India to the south. After the Nepali Rana king,

some of these cunning individuals are memorialized in folk stories of the Southern Lobas, one of which relating to irrigation water in Phalyak and Dhakarjhong is presented and discussed in Chapters 5 and 7.

In the Lumbuk area, as in the rest of the Kali Gandaki valley, people practice irrigation agriculture on terraced fields. They irrigate with water coming directly from the Lumbuk River or *lungba* as they call it. *Lungba*, it was explained to me, refers to both the stream and the canyon in the villages. The climatic conditions are such that they allow two harvests per year. The *neh* (barley) and *chiyak* (naked barley) planting season, called *kar*, lasts from October/November to May/June. Following the *neh-chiyak* harvest, *kiapre*, or buckwheat is planted, marking the beginning of the summer growing season: *nak*. With enough snowmelt for irrigation, the crop is harvested in August/September. In Lumbuk Canyon, horticulture is becoming increasingly important. *Shiao* or apple, and *chuli* or apricot orchards are being planted with increasing frequency because they can be sold for export at a high price. The orchard growing region is concentrated around in the Thakali Villages south of Jomsom, however, the ‘apple belt’ as it is called, has started shifting northward, or higher in elevation, even into Upper Mustang. Locals have noticed this as a result of increasing temperatures. In addition to agriculture and horticulture, many villagers also own grazing animals, mostly goats but also some sheep, and draft animals such as *dzo* (yak-cow hybrids) and mules. Cows, horses and chickens are among the other animals kept and reared.

Today, the villagers of the Lumbuk area, although mostly reliant on traditional agro-pastoralism, supplement their earnings through various other means. Some families have invested in the tourism industry, which has increased steadily since the 1970’s and is now a reliable source of income. Backpackers are attracted by the ‘Annapurna Circuit’ trekking

Jang Bahadur Rana (1846-79) introduced ‘administrative reforms’ on the trade route (von Fürer-Haimendorf, 1998 [1975]), a shift in the salt trade practice occurred. This had an important socio-economic effect in the Kali Gandaki valley, from Lo to Thak Saatsae. Under the new rules, trade was no longer tariff-free, and a tax collector was assigned along the trading route. Customs contracts were eventually auctioned for three-year periods to the highest bidder, and the contractor was awarded the title of *subbha*. *Subbha*, as explained by von Fürer-Haimendorf (1988 [1975]) is “a designation otherwise reserved for the lowest rank of gazetted government servants. [But in] the case of Thak Khola [the area of Thakali settlement along the Kali Gandaki], an area remote from any of the centres of regular administration, the customs contractor was also... a magistrate” (143). The contract landed in the Thakali community of Tukche when it was awarded to a man who served as an interpreter for the Nepalese army in the Nepali-Tibetan war of 1855-56. For over one hundred years the *subbha* position was held in Thak Saatsae, allowing the Thakalis to monopolize the salt trade and accumulate great wealth and power. Members of the *subbha* family eventually came to exert some control over Baragaon, including the Lumbuk area. Thus, the salt trade was an important economic activity in the Kali Gandaki valley for a millennium until the Chinese invasion of Tibet in the 1950’s abruptly cut off this ancient practice.

route encircling the entire Annapurna massif. They also flock to remote Upper Mustang, which only opened to tourism in 1992 after being restricted since the Chinese invasion of Tibet in 1950. Both trails follow the Kali Gandaki River, passing relatively close to the Lumbuk villages. However they are still too far away, so any business with tourists must be located on the main trail⁸.

Many other villagers migrate to Pokhara, Kathmandu and India during the winter months to escape the harsh Trans-Himalayan cold and to earn money trading in those places. By far the most common trade goods are sweaters bought in the state of Punjab and sold in the state of Assam in India. In the summertime, many adult males in their 20's to 40's venture to the high pastures, braving freak summer snow storms and potentially fatal acute mountain (or altitude) sickness, to collect a fungal worm parasite called *yartsa gunbu* (*Cordyceps sinensis*), which is sold for a high price in the aphrodisiac market. Other economic activities include the production of local barley beer and spirits, called *chang* and *ara*, respectively, as well as some summer trading with the nomads of the Dolpo highlands to the east. But the most lucrative activity is emigration to Pokhara, Kathmandu or overseas (mostly the United States, Japan and Korea) and the remittance of earnings back to family still residing in Mustang. However, only richer households are able to exploit this strategy, I was told.

Out-migration in Mustang leaves many houses and fields vacant, so many families from Dolpo as well as Upper Mustang come to Lumbuk Canyon and Lower Mustang as sharecroppers. They make agreements with their absentee landlords to uphold the property and the fields in exchange for free rent. Thus a significant demographic shift is taking place in the area. Research is needed to assess the effects of out-migration on the nomadic culture of Dolpo as well as the farming villages of Upper Mustang. An effect of out-migration is also labor scarcity. The need for labor is most crucial during the harvest season. Young Southern Lobas themselves opt to emigrate permanently or for seasonal labor during the harvest, so laborers from Upper Mustang as well as *rongbas*⁹ or Nepali laborers from lower-lying districts to the south fill the labor demand. Except for the sharecroppers, they are not land owners so their labor must be compensated for with currency, food and shelter. Thus there is an increase in the outsourcing of community and shared labor to wage laborers, causing a

⁸ This is the case with the village of Eklobhatti (Nepali: 'lone tea-house'), in reality just a cluster of 5-6 guest or 'tea houses' (see Lumuk detail map, Figure 2.2)

⁹ Local Tibetan slang: a label to refer to Nepali lowlanders, with seemingly derogatory connotations

shift in the local production system. This is an important effect of out-migration in this mountain district on the margins of the modern world. It should be further noted that the ‘margin of modernity’ is marching ever nearer as a road is constructed from the south which will connect this remote rural area to the Nepali national road system for the first time in history. At the time of fieldwork, the road was said to be roughly a year from completion.

2.4 Introduction to the Colca Valley

The Colca Valley (see Figure 2.3) is part of a river system that cuts the second deepest canyon in the Andes¹⁰, and one of the deepest in the world. It is located in Caylloma Province in the northeast part of Arequipa Department in southern Perú, where the Cavana and Collagua villages of Cabanaconde and Tapay, respectively, are located. Similar to the upper Kali Gandaki valley, the Colca Valley is in the periphery of the modern developed world and on the margins of the political influence of its governing state, Perú. The meltwater dependent agro-pastoralists living here are still primarily dependent on their millennia-old life ways, which they practice with relative autonomy and detachment from the state in their corner of the Andean highlands.

Geographically, the Colca Valley of southwestern highland Perú is very similar to the upper valley of the Kali Gandaki in Mustang. It is located in the high Andes Mountains, part of the system of ‘Inter-Andean’ valleys, characterized by a micro-rainshadow effect in the inner valley due to high surrounding mountains. Thus, precipitation increases with elevation in these valleys (Guillet, 1987). Snow and ice accumulate on the high peaks, feeding mountain streams with meltwater. The valley is flanked by two main mountain ranges: the Chila Range to the north of the valley, and the volcanic Ampato Range on the higher side of the valley to the south (Figure 2.3). The highest peak of the Chila Range (of the same name) rises to just 5,654 masl, while opposite in the Ampato range, Ampato and Hualca-Hualca Volcanoes tower four kilometers above the Colca River reaching 6,288 and 6,025 masl, respectively. These massifs are part of an important high altitude grassland plateau called the *altiplano* or ‘high plateau’ in Spanish, which is essential for local camelid¹¹ pastoralism. The Colca’s climate, like Mustang, is also affected by a far-reaching regional rainshadow. However, the Peruvian rainshadow is induced by the cold oceanic current which flows north

¹⁰ The nearby Cotahuasi Canyon is the deepest

¹¹ Mammal of the *Camelidae* family, including llamas, alpacas, vicuñas and guanacos of the Andean highlands

Arequipa Department, Perú



Figure 2.3 Arequipa Province map and with surrounding areas

along the Pacific coast of sub-equatorial South America from Antarctica. Marine air over the Humboldt Current as it is called, although moist, is cool and not conducive to precipitation. As a result, the coast experiences little or no precipitation. This effect results in the hyper-arid Atacama Desert of northern Chile and far southern Perú, as well as the Peruvian coastal desert which stretches all the way north to the Ecuadorian border. As the elevation rises in the Andes, so does precipitation, which falls as rain until roughly 4,500 masl where it turns to snow (source: field conversations). Annual precipitation in the lower Colca Valley averages around 400 mm annually (Guillet, 1987), making it semi-arid. Precipitation falls mostly during the rainy season from November/December to March/April.

The Colca River drains highland grasslands northeast of the Colca Valley, flowing east to west through the valley itself, finally tending to the southwest before it joins with the Majes River, which flows southward across the rainless Peruvian coastal desert to the Pacific Ocean. Near its headwaters, the Colca River is blocked by the Condoroma dam which was constructed by the Majes-MACON project. This trans-national consortium also constructed the Majes canal in the 1970's which diverts water from the reservoir along the southern edge of the Colca Valley to the *pampas de Majes* or 'Majes plains' in the coastal desert for industrial agriculture. Most of the villages along the south rim of the Colca Valley, like Cabanaconde utilize a portion of this water in addition to snow and ice-melt for irrigation today, which has resulted in the recovery of agricultural lands that have been abandoned since the indigenous population declined sharply following the Spanish Conquest (Gelles, 2002). The villages on the north rim meanwhile are dependent solely on perennial and annual streams from meltwater, and many abandoned *andénes* or terraces still exist.

In this thesis, I differentiate between two main geographical regions within the Colca river system itself, the *Valley* and the *Canyon*. The Colca Canyon can be said to encompass the entire system itself, however the Colca Valley (*Valle del Colca*) denotes the shallow upper stretch of the canyon on which human settlements and agricultural terraces are situated. Most settlements are located at the well-graded bases of broad alluvial slopes overlooking the inner valley (Guillet, 1987: 410). Cabanaconde and Tapay villages are located on opposite sides of the valley at its far western end where it widens and the slopes gradually become steeper forming the steep V-shaped canyon (see Figure 2.4). The Hualca-Hualca River stretches roughly 16 kilometers, draining the snow-and-ice-capped volcano of the same name, cutting through a broad alluvial fan toward the Colca River. On the opposite side of the valley, the

Detail of Colca Valley

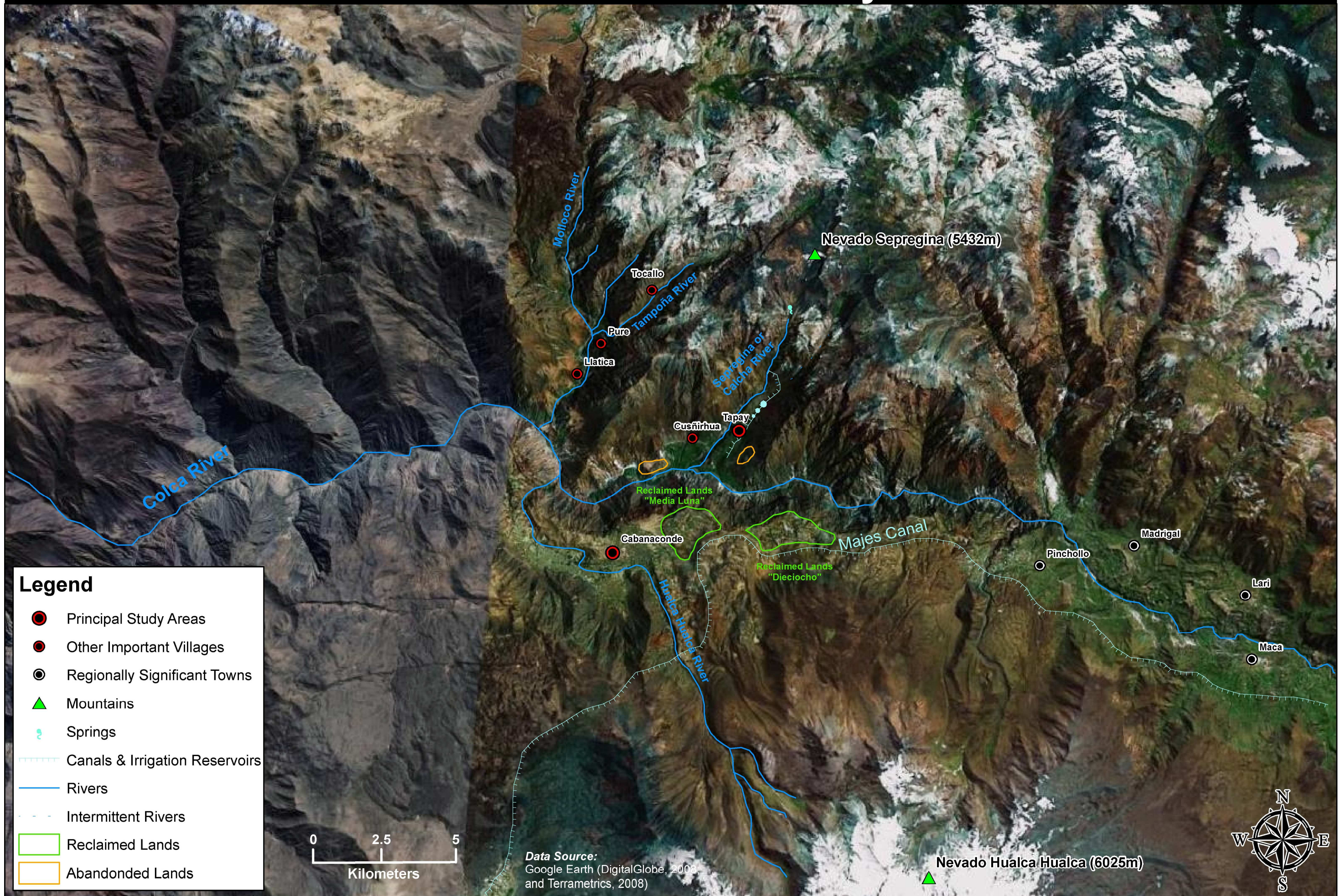


Figure 2.4 Detail map of the Colca Valley

Sepregina or Calcha River drains snowmelt and spring water from Sepregina Mountain (5,432 masl) down through Tapay on a much steeper incline than the Hualca-Hualca River, running roughly 9 kilometers before meeting the Colca River. I focused only on Tapay village *proper*. Tapay is actually composed of several different hamlets scattered across a wide area, including the villages of Cusñirhua, Latica, Pure, Tocallo and others. Furthermore, these villages are divided based on the Andean dual *anansaya/urinsaya* concept of spatial organization. East of the Sepregina River constitutes *anansaya* or the “upper division”, while west of the river is *urinsaya* or “lower division” in Quechua (more on this in section 2.5.2). For this study I only interviewed residents living within the central village, which is also the administrative capital of the district.

Although the Colca Valley has been under the control of the pan-Andean Wari (A.D. 600 to 1000) and Inca civilizations (c. 1200 to 1532), it is best characterized by the Collagua and Cavana indigenous inhabitants. Although these groups enjoyed a large degree of autonomy under other indigenous Andean state authorities, they adopted many religious practices and beliefs and inherited the Quechua language¹² from the Inca, the last great aboriginal empire of the Andes (Gelles, 2002: 43). Following the Spanish Conquest led by Francisco Pizarro in 1532, Catholicism was forcefully imposed with the help of the *encomienda* system, which reorganized the indigenous population around missions in order to Christianize them. The Spanish even attempted to erase indigenous beliefs altogether through the *Extirpación de Idolatrías* (Extirpation of Idolatries) in which religious objects called *huacas*, especially in the form of wooden or stone images and ancestor mummies, were destroyed (Arriaga, 1968 [1621]) (see also Chapter 6). Despite this traumatic siege against indigenous Andean religion and ideology, syncretisms still emerged, and rituals have survived (see Chapter 6). But today the syncretic form of Andean Catholicism in the Colca Valley is under yet another threat from changes brought by Protestant evangelists who see the ritualized Catholic system as sinful. The Catholic ritual calendar while reinforcing local beliefs, also organizes community resource management practices, the loss of which is challenging traditional management practices (see Paerregaard, 1993, 1997, Gelles, 2002).

Tapeños and Cabaneños, like the rest of the inhabitants of the Colca Valley traditionally practice agro-pastoralism as their principle livelihood method. All agriculture is dependent

¹² The *lingua franca* of the Inca Empire

on irrigation during the dry season from April/May to December, and rainfall from December to April. The main cultivar and regional specialty of the lower Colca Valley is corn (*Zea mays*), although wheat (*Triticum* sp.), barley (*Hordeum* sp.), *kinowa*¹³ (*Chenopodium quinoa*), *kiwicha* (*Amaranthus edulis*), potatoes (*Solanum* sp.), and *habas* or fava beans (*Vicia fava*) among many others are also part of the traditional agro-ecosystem (Paerregaard, 1997: 86). Cabanaconde is especially well known for the quality of its corn, locally called *maíz cabanita* (named after the village). Today industrial agribusinesses have introduced cash crops such as artichokes for international export, which may be causing a shift in production in villages along the Majes Canal such as Cabanaconde. Tapay, in addition to agriculture, specializes in fruit orchards. These include apples, pears, figs, peaches, quince, and several “varieties of American origin” (ibid: 90)¹⁴. Villagers use a wide array of production zones which correspond to an equally extensive range of ecological-altitudinal life zones within the canyon. The fruit production zone is located on both banks of the Colca River at 2,200 masl. Due to steep cliffs on the south side of the canyon, this zone continues only up the north slope of the canyon to around 3,000 masl in Tapay village proper. Agriculture dominates between approximately 2,900 and 3,400 masl in Cabanaconde, and from 3,000 to 3,800 masl in Tapay. Finally sheep, llama, and alpaca herding is practiced in the high pastures, between 3,600 and 4,400 masl above Cabanaconde and between 3,800 and 4,800 masl above Tapay (Paerregaard, 1997, Gelles, 2002). The production from local agro-pastoralism is important for the traditional regional barter system of the Colca Valley, which has sustained its human populations throughout the ages.

Today, people rely on several other livelihood methods in addition to agro-pastoralism in order to participate in the external market system. One example is the collection of the lucrative *cochinilla* or cochineal (*Dactylopius coccus*), an insect with a natural red dye that is found on the common *Opuntia* cactus of the canyon. It is exported for use in textiles and cosmetics in Europe, Japan and the United States. Tourism has also bloomed in the Colca Valley because of its natural beauty and amazing anthropogenic landscape. The opening of a graded highway into the valley in the 1970's by the Majes-MACON project has greatly facilitated the expansion of this industry, as well as created other links to the ‘modern’ world. Colqueños move easily between their remote valley and the larger cities of Perú, mainly

¹³ Alternate spelling: *quinoa*

¹⁴ These include *pakay* (*Inga feuillei*), *tuna* (*Opuntia ficus indica*), *luqma* (*Lucma obovata*), *chirimoya* (*Annona cherimolia*), *guanabana* (*Annona muricata*) and *guayaba* (*Psidium guajava*) (Paerregaard, 1997: 90).

Arequipa and Lima. Large migrant settlements in both cities have expanded since the 1960's and are sizeable today. With increasing participation in the market economy, Colqueños, especially from Cabanaconde have emigrated to the Washington, D.C. area (see Gelles, 2002). Remittances from migrants constitute an important part of the economy in the valley as a whole, but the effect is especially visible in Cabanaconde where several fancy tourist hotels built with the help of remittances rise above the traditional mud-brick houses of the village like sentinels. One informant said that villagers who have emigrated have been known to spend 30-40,000 USD for just the village *fiesta* or feast day. Occasionally they even hire a *matador* from Spain to put on a bullfight for the village-wide celebration!

Out-migration however has had a negative effect on labor in the Colca Valley, just as it has in Mustang, since manpower is essential to agriculture and irrigation. This affects the *ayllu* production system or the “corporate social unit based on the kindred” (Paerregaard, 1997: 254). Through the *ayllu*, shared labor or *ayni* is organized between land-owning villagers. When people migrate away, it becomes harder to organize labor. In places like Tapay where the traditional *chakitaqlla* or Inca foot-plow is still the primary tilling implement, large labor forces are essential to agriculture, so a lack of labor is devastating. Cabanaconde has experienced an influx of migrants from the neighboring province of Espinar in Cusco Department to work in the *ampliaciones* or expanded and recovered agricultural lands irrigated by the Majes Canal. However, since they do not own any lands, they cannot participate in the *ayni* system, so their labor is compensated for with money. This is causing a shift in the local production system to a more capitalist model, similar to the case of the Southern Lobas in Mustang.

Thus many changes are precipitating in the Colca Valley from the traditional production system to religious beliefs, which have repercussions ultimately for the irrigation systems that sustain Cabanaconde and Tapay. I will now shift attention to the importance of irrigation in the arid and semi-arid Kali Gandaki and Colca valleys.

2.5 Irrigation in Drylands

A fundamental necessity of intensive crop production in drylands is a supply of freshwater for irrigation. In arid and semi-arid mountain areas like Mustang and the Colca Valley, annual snowpack and perennial glaciers are naturally the most reliable sources.

The terraced fields of Mustang and the Colca Valley use simple gravity irrigation systems developed independently in each region. Although they arose on opposite sides of the globe, the systems I observed in the field bear a remarkable resemblance in form and function to each other.

Both are located in micro-watersheds along small headwater streams fed by mountain snow and ice, which drain into larger local river systems in the area (Kali Gandaki River in Mustang and Colca River in the Colca Valley). Water is diverted by a rustic weir constructed by piled stones found in the immediate riverbed into what traditionally were earthen canals, but today are cemented along stretches. The main artery or mother canal conveys water to one or several earthen collection tanks called *tsingu* in Mustang and *reservorios* or *estanques* in the Colca region. These collection tanks seem to be an adaptation to low water discharge or diurnal streams (streams which have a higher flow during the daytime due to melting snow and ice). The collection tanks are opened in the morning to allow water to flow to the fields for irrigation and are sealed up in the late afternoon or at night (depending on how quickly fields are irrigated) and allowed to refill. There are slight variations of this model practiced in each area, which are altered further in response to fluctuations of stream output in any given period. Below the collection tanks, the earthen canals continue and branch into secondary and tertiary canals, conveying water finally into individual farmers' fields, which are then allowed to fill until completely flooded. Now I will discuss in brief the management system that is employed in each area.

2.5.1 The Mustang *Tungba* System

Irrigation in the Lumbuk Canyon area resembles systems in other places in Upper Mustang (see Chhetri, 2008) and the Trans-Himalaya (see Wacker, 2006). The irrigation is managed by the village headman in the Lumbuk area, locally called the *kemba*. The *kemba's* task is simply to keep track of the order that irrigators shall be given water in an irrigation cycle. In Dhakarjhong, I observed the irrigators deciding the order of irrigation for the upcoming season by engaging in a game of dice after the communal cleaning of the irrigation canal and *tsingu*. Thus, order is decided by chance.

Land is divided into a number of plots called *tungbas*, of which there are 22 in Dhakarjhong. During the dice-throwing though, only 11 *tungba* are decided for in this way because I was told that the order of the other 11 is already set. The first to irrigate are always members of the Thakuri ‘caste’, which here does not denote the same concept as in Hindu society. People in the Thakuri families are privileged, it is said, because of the “past deeds of their fathers”, thus they are granted this privilege, as well as exemption from community labor groups (source: field conversations).

The *tungba* division is based on the amount of time it takes to irrigate the plots of land, rather than surface area since field sizes are so variable. Thus this system is based on time standardization. People can own various fractions of a *tungba*, from one-half to one-eighth¹⁵. The irrigation time is referred to as *churi*¹⁶. I was told that two *tungba* should be watered per day, ideally over six hours each. However, if there is not enough water available to water one *tungba* in six hours, the irrigation period is lengthened into the night for *tsemu churi* or ‘nighttime watering time’ (daytime *churi* is called *ngimu churi*). This is usually practiced during the *nak* or summer buckwheat growing season when irrigation water runs out because mountain snow and ice start diminishing.

All villagers who have *churi* (there are some landless villagers who do not, such as Hindu lowland Nepali blacksmiths and seamsters), including sharecroppers, have to participate in village labor groups, called *lengyi* and *mepta* for irrigation canal maintenance. During the annual irrigation canal and reservoir cleaning, a *lama* or Tibetan Buddhist monk performs *shyapten* or a ritual prayer ceremony, in which sacred *shukpa* or juniper needles are burned in offering to the gods. Communal labor is sanctified by this ritual, and they seem mutually reinforcing, creating a sense of community solidarity.

2.5.2 The Colca *Anansaya/Urinsaya* System

In the Colca Valley, several variants of the dual *anansaya/urinsaya* organization system are implemented in the distribution and conceptualization of irrigation waters (see Gelles 2002, Paerregaard 1994, 1997). Cabanaconde and Tapay exhibit, furthermore, two distinct forms of this system, the main reason for which lies in the different physiognomy of the two villages,

¹⁵ A full *tungba* is called *tsangu*; half is *pe*; quarter is *shizur*; eighth is *kezur*

¹⁶ A compound word, where *chu* means water in Tibetan

as well as the number of irrigation water sources supplying each. However, despite these spatial, physical and geographic differences, the logic of this system is based on the core concept of the duality of *anansaya* and *urinsaya*.

The dual organization of space, society, ritual and politics in the Colca Valley is a legacy of Incan expansionist policy, however in institutionalized and symbolic form it far pre-dates the empire (Gelles, 2002: 121-125). *Anansaya/urinsaya* duality is originally based on what the Inca called *ceqes*, 41 ‘lines’ radiating from the temple of the sun in Cuzco to sacred sites around the capital, each of which demanded its own ritual devotion. These were divided into four main groups based on the quadripartite *suyu* organization scheme, and then again into the dual *saya* structure, which consists of *anansaya*, the “upper moiety¹⁷”, and *urinsaya*, the “lower moiety”. In Cuzco proper, this dual system marked a clear spatial division of water and land, and so also organized the rights to each for the people also living under this system (ibid.). Throughout the Inca Empire, the system was only partially adopted. So the *anansaya/urinsaya* ‘moieties’ came to have the most social impact in nations reorganized by the empire, including the Collagua and Cavana nations of the Colca Valley.

In Tapay and Cabanaconde, the local irrigation systems are based on dual organization. The irrigated lands of each village pertain to either the *anansaya* or *urinsaya* moieties, which are defined by a main axis of division. In Cabanaconde, two central managers of irrigation pertaining to each moiety, called *yaku alcaldes*¹⁸ are appointed. During the irrigation season, they manage a rotating irrigation schedule and are also in charge of special rituals to honor *Pachamama*, the goddess of the earth and *huacas*, sacred objects (mostly destroyed during the Extirpation of Idolatries), or sites related to water sources and other natural features of the landscape. These ritual offerings are performed during the annual cleaning of the irrigation canals as well as the *faena* or communal labor group which is led to the snowline to carve *zanjas* or channels to aggregate meltwater sources into the main stream to augment flow to the villages. Since in Tapay the separation between *anansaya* and *urinsaya* is over a much greater distance than Cabanaconde, the village and its irrigated lands pertain solely to *anansaya*. Thus, this study only concerns this moiety. But because of Tapay’s abundance of

¹⁷ ‘Moiety’ simply means “half.” Gelles (1995) notes that “in the anthropological literature, moieties are generally associated with kin groups and different marriage and alliance arrangements” but that “dual social divisions often have little to do with kinship” as is the case in the “opposed social halves” and “dual social divisions” in the Andean context (Gelles, 1995: 733)

¹⁸ *yaku* (Q.) water; *alcalde* (Sp.) mayor, however in this context refers to ‘manager’

water—it has 53 different sources, including 21 springs, and 32 offtakes from 6 rivers—compared to Cabanaconde—the Hualca-Hualca River and the Majes Canal—its irrigation is organized in a decentralized fashion, in contrast to most Andean irrigation systems (Paerregaard, 1997: 61). Here, each main canal is managed independent of a central authority, or *yaku alcalde* as in Cabanaconde, but rather by an elected official called a *regidor de aguas*¹⁹. The *regidor* is also responsible for ritual offerings, like the *yaku alcalde*, especially during the annual canal repair and cleaning. Both posts traditionally are obligatory and rotate between villagers each year.

The most significant changes in the systems' management today is the abolishment of the *anansaya/urinsaya* system in Cabanaconde in favor of the *de canto* system in which a manager is paid by the village to distribute irrigation waters without the rotation between *anansaya* and *urinsaya* fields. This change has occurred since the traditional system was deemed too inefficient in its water usage by state engineers, according to one informant. The Majes canal is blamed for the loss of some of the rituals associated with maintenance in Cabanaconde since the *faenas* to augment the river flow are not performed anymore. The recent influx of Protestant evangelists is also eroding away at the traditional ritualized form of irrigation because it does not conform to their moral values of work, discipline and “progress”.

2.6 Summary

The Southern Loba of Mustang and the Collaguas and Cavanos of the Colca Valley are just two examples of meltwater dependent irrigation societies which have developed, endured and changed over the centuries. In the next two chapters, I will present the theories associated with people's perceptions and the methodologies I used to assess them to help arrive at an understanding of the cultural cognizance of Mustangis and Colqueños of the environmental changes affecting their meltwater irrigation.

¹⁹ (Sp.) literally ‘water manager’, however specifically denoting an irrigation water manager in Cabanaconde and Tapay



Photo 4 Dhakarjhong framed by the Muktinath Himal across the Kali Gandaki gorge



Photo 5 Tapay below Nevado Sepregina (Tapay center right, Cusñirhua bottom left)

Chapter 3: Theoretical Perspectives

3.1 Introduction

Small-scale irrigation societies are the unit of interest and the perceptions of individual farmers the foci of this study. Accordingly, we should aim to ask about the basic nature of the human-environment relationship and what role perceptions play in a context of environmental change. Social science theories about humans and the environment can generally be divided into two epistemological camps. One considers culture as “a reflection of a pre-given, external world” (Aase, 2005)—the “world” here referring to the environment, which includes water resources. Moreover, water has been considered a crucial factor in the development of human cultures to varying degrees by some theorists within this epistemological current. Among these are Karl Wittfogel, who proposed the Hydraulic Hypothesis (see Wittfogel, 1957) and Julian Steward, who developed cultural ecology (see Steward, 1955). I will refer to this group as the ‘environmentalists’. The ‘culturists’ on the other hand, such as Geertz, Durkheim, Shutz and many others, have argued that the world is instead a reflection of culture. Thus culture constructs, and is the primary determinant of social practice, behavior and change. Here, environment is no longer an “external world” pre-determining culture in all its forms and functions. These currents represent two sides of a discussion over how human-environment interactions should be viewed, whether culture as a function of the environment or vice versa. Although this study on human perceptions signals a phenomenological, and therefore culturist approach, a bricolage of different theories borrowing from both currents will help to widen the discussion on perceptions of environmental phenomena. Perceptions of the environment inherently integrate the environment and people through peoples’ interaction with and experience of the environment, so we should discuss the main arguments of each side. Even Geertz, a cultural hardliner concedes to this point (Geertz, 1973b in Shankman et al, 1984):

The danger that cultural analysis, in search of all-too-deep-lying turtles, will lose touch with the hard surfaces of life—...with the biological and physical necessities on which those surfaces rest, is an ever-present one. The only defense against it, and against, thus, turning cultural analysis into a kind of sociological aestheticism, is to train such analysis on such realities and such necessities in the first place.

The *reality* and *necessity* on which this analysis of cultural perceptions stands is the mountain meltwater utilized by Mustangi and Colca Valley villagers. Although fluid, it is one of these “hard surfaces” on which cultural life is based. And as such, it presents itself as a platform for some ‘softer surfaces’ such as cultural perceptions, to sit upon. Thus we join the debate surrounding whether the way people understand a ‘hard surface’, like water is a feature held in common cross-culturally, or whether perceptions and understandings of water are purely cultural projections. Are some cultural features and environmental conditions concomitant? If so, what does a change in environment pose for meltwater dependent highland irrigators? To understand this, we need to enter people’s lifeworld and try to see and understand the changes through their own eyes, if possible.

In this chapter, I will review theories of reality to show that environmental changes should be approached through the perceptions of small-scale irrigators in meltwater dependent mountain areas. I will begin by presenting arguments from both sides of the environmentalist-culturist discussion to show how aspects from both theoretical fields can inform studies on perceptions and the human-environment relationship. This will help lay the groundwork for ultimate analysis of Mustangi and Colqueño perceptions via the concepts and principles of Thompson’s Cultural Theory and Steward’s *cultural core*.

3.2 External Reality or Cultural Projection?

In social science literature, debate has centered on why cultures and civilizations manifest in such varied forms and what the agents of this variety may be. The arguments have diverged historically depending on whether environment-centered or culture-centered explanations are emphasized.

Karl Wittfogel’s and Julian Steward’s work on the hydraulic society (Wittfogel, 1957) and cultural ecology approaches (Steward, 1955), respectively, recognize environmental factors as central to the emergence and development of cultural features. Wittfogel proposed that large-scale irrigation was a key causal factor for the rise of powerful states in history due to its need for complex management and bureaucracy to function. He states:

If irrigation farming depends on the effective handling of a major supply of water, the distinctive quality of water-its tendency to gather in bulk-becomes institutionally decisive. A large quantity of water can be channeled and kept within bounds only by the use of mass labor; and this mass labor must be coordinated, disciplined, and led. Thus a number of farmers eager to conquer arid lowlands and plains are forced to invoke the organizational devices which on the basis of a premachine technology offer the one chance of success: they must work in cooperation with their fellows and subordinate themselves to a directing authority. (Wittfogel, 1957:18)

Since early large-scale irrigation mostly occurred in the arid and semi-arid regions of the world like Mesopotamia, China and Egypt, as Steward added, the hydraulic hypothesis implied, hence, that particular environmental factors provided the preconditions for the rise of the state.

Steward's own unique position on the effects of environmental conditions on human culture is expressed through his concepts of cultural ecology. Cultural ecology asserts that human adaptation to the environment is the essential factor determining cultural variability. From this, "the local environment [is] the extracultural factor" and thus "the adjustments of human societies to [it] require particular modes of behavior or...a certain range of possible behavior patterns," (Steward, 1955:36) latitude permitted. Influenced by biological and ecological terminology, Steward argues that humans are part of the web of life, but not just in the biological sense. The human community, he clarifies, is part of the total web only "to such cultural features as are affected by [their environmental] adaptations" (ibid, 39). These particular features of a culture are what constitute Steward's *cultural core*. This concept is defined as "the constellation of features which are most closely related to subsistence activities and economic arrangements" of a society. The features of the "core [include] such social, political, and religious patterns as are empirically determined to be closely connected with these arrangements" (ibid: 37), or in other words are those patterns most "intimately related to the bio-physical environment in which it has evolved" (Aase, 2005). Thus, Steward is mainly concerned with how human adaptations to the environment influence cultural development and change. Although Steward's idea of cultural adaptation to the environment is criticized as determinist, it should not, however, be entirely dismissed. Biological terms and categories such as 'adaptation' and 'niche' imply that "the natural environment is simply

a given which requires organisms [and culture] to shape themselves to interact with it and fit into predetermined slots provided by it” (Mikesell, 2002). This narrow characterization of the concepts overlooks their intended meaning. Rather, Steward’s use of ‘adaptation’ was influenced by Marx’s dialectic and materialist approach which, “[starting] from the standpoint of humans as producers of their life through creative engagement with the world” views humans as “both the product of their environment and the producers of it” (ibid). This wider characterization of human adaptation as a dialectic between human action and environmental limits broadens the potential for describing humans’ interaction with the environment and the ensuing cultural traits that may result from this. Whether there are any such traits in the cases of Mustang and the Colca Valley will be discussed in Chapter 8.

In contrast, the ‘culturists’ take a different approach to explain the relative position of environment in the development and change of culture. Using the same figurative image of the spider’s web as Steward in reference to ecology, Geertz states, “man is an animal suspended in webs of significance he himself has spun” (Geertz, 1973a: 5). The web Geertz refers to, though, is culture itself. The culturist argument at face value asserts that culture is entirely human constructed—that the cultural world we inhabit is the result of our own creation. Steward would criticize this as tail-chasing “in the fruitless assumption that culture comes from culture” (Steward, 1955: 36). However, the culturist approach goes far beyond notions of culture spontaneously springing into being as Steward would charge. The key to cultural development is in its complex development through the growth and construction of systems of meaning. Geertz would criticize Steward’s approach as reductionist and dismissing of the potential of “meaningful forms”, or anything that has meaning to explain culture (i.e. any ‘event’, broadly speaking: actions, symbols, signs, text, speech, etc.). In Geertz’s own words, “meaningful forms...have as good a claim to...existence as horses, stones and trees, and are therefore as susceptible to objective investigation and systematic analysis as these apparently harder realities” (Geertz, 1973b, in Shankman, 1984: 269). Geertz’s systematic approach—intelligible interpretation of culture through ‘thick description’ and the context of a cultural event—relies on semiotics or the interpretation of signs and all contextual phenomena to penetrate cultural meaning systems. But despite the depth of culture and meaning systems, we must not, even in Geertz’s own terms, lose sight of the “hard surfaces” on which cultural phenomena sit, so to speak. Even if culture is explained by differential meanings between them, humans are still tied to the physical environment. With this in mind, contradictions and all, I now turn to more background on cultural

perceptions as to further discuss other arguments on the culturist side of this epistemological debate.

3.3 Human Perceptions of the Environment

To this point I have shown different sides of the argument surrounding how human cultures develop and come into being, and to what extent the environment is involved. Since the environment is the medium in which we live, and is the edifice of our most basic biological needs, people's perceptions of it warrant discussion. I will first appraise the topic of perceptions as viewed in the philosophical field of phenomenology, through various theorists' lenses. Then finally I will present another angle on the cultural construction of nature through a presentation of Cultural Theory (see Thompson et al., 1990) to open the discussion on whether or not the perceptions of Mustangis and Colqueños, as the proverbial "villager on his remote hillside" (Thompson, 1995: 37) in the context glacial 'melt-down' can be explained by the cultural typology of 'myths of nature'.

3.3.1 Phenomenology and Perceptions

Human perceptions first became a subject of serious philosophical consideration as a social critique of logical positivism. As such it is similar to the culturist stance over the human-environment question addressed above. The most fundamental concept of phenomenological philosophy is the *life-world*, or the "total sphere of experience circumscribed by a natural environment, man-made objects, events and other individuals" (Wuthnow et al., 1991 [1984]: 31). To view the world of *phenomena*, or 'that which appears', through the inevitable filter of the life-world should reveal the 'essence' of things or the 'thing itself' (Birkeland, 2006). Thus, the goal of phenomenology is to "[penetrate] the world of everyday life" (Wuthnow et al., 1991 [1984]). The life-world is the foundation for gaining knowledge, which by the nature of the assumptions of phenomenology is subjective and individual-centered. In other words, "knowledge proceeds from the world of experience and cannot be independent of that world" (Holt-Jensen, 1999).

Historically many social scientists have followed in the current of phenomenology, including cultural analysts like Alfred Schutz and Peter Berger. The theoretical framework developed by Berger in particular, influenced in key ways by Schutz, is useful for the analysis of the

cases of Mustang and the Colca Valley. I argue this because of its utilization of a “sociological dialectic” (Wuthnow et al., 1991 [1984]) to describe the perception-based formation of social reality. This dialectic process in turn is useful for illustrating how the agro-pastoralists’ perceptions of environment change contribute to a wider societal attitude or ‘constructed reality’ about them.

The Bergerian Cultural Framework

Berger formed a comprehensive approach to viewing culture and society from the bottom up—that is from perceptions at the most basic level, to culture and society in all their manifestations at the most complex—to illustrate his view on how culture and society form and why. This process is best described as a *dialectic* or a sustained and unremitting interaction or interplay (ibid, 38), which is a key concept for the discussion of peoples’ varying perceptions of the environment. Below, I present Berger’s framework, starting with basic assumptions about humans’ need by default to ‘create’ a social world imbued with subjective meaning. I will then describe how this collectively created, individually reinforced world arises continually from the Bergerian *dialectic*. Finally I will show how this gives rise to knowledge part of more complex meaning systems, culture and societal structures such as institutions. Berger’s ideas serve to demonstrate how peoples’ perceptions reflect established and changing meanings in culture deriving from their direct interaction with social spheres and the environment.

Berger’s framework begins with the principle assumption that humans are understood to be biologically underdeveloped by nature, lacking the hard instincts that are the basis of the “firm and dependable” realities of the animal world. The “artificial and therefore inherently precarious” (ibid: 27) ‘human reality’ needs to be formed through other, non-biological means. These means are identified as two key “anthropological constants” (ibid: 24) or concepts that are built-in to the human condition: *externalization* and *sociality*. The former of these is described as humans’ “outpouring of being”, and the latter is the basic tendency and need of humans to interact socially. These constants give rise to the construction of a socio-culturally and psychologically created reality, and are the basis for the dialectic process of reality and culture construction.

The Bergerian *dialectic* consists of a continuous process or simultaneous interplay of three basic “dialectic moments” (ibid: 39). These include externalization, objectivation, and internalization. To repeat, externalization is “individuals’ ongoing outpouring of physical and mental being into the world” (ibid: 39). This again is the result of the human need to develop what is not provided naturally via biological instinct and is also described as the human ‘essence’. Objectivation is the acquisition of character from an objective source or ‘reality’ from ‘without’, so to speak. This ‘objective world’ is “not as reality only plausible to the individual but as one experienced in common with others” (Berger, 1967 in Wuthnow et al, 1991: 39). Thus the ‘objective’ is essentially the common aspect among subjective understandings of reality. Finally, internalization, as it suggests, is the process through which the ‘objective world’ is “reabsorbed into consciousness’ such that ‘the structures of this world come to determine the subjective structures of consciousness itself” (Wuthnow et al, 1991 [1984]: 39). As Berger (1967 in Wuthnow et al, 1991 [1984]:40) himself elegantly summarizes:

It is through externalization that society is a human product. It is through objectivation that society becomes a reality sui generis. It is through internalization that man is a product of society.

It must be reemphasized that the dialectic moments occur simultaneously as part of a continuous process of cultural construction and reconstruction, in turn resulting from the intersubjectively or *socially driven* interplay between the subjective and objective. This process unfolds as humans experience reality, infuse their own meanings into it, and make sense out of and fit into the ‘objective world’ around them (ibid). Meaning and knowledge thus are grounded in the world of experience. As people live life, they are faced with new experiences, and so new meanings must be constructed in order for the life-world to continue to have coherence. Through subjective interpretation, new experiences are localized within already existing meaning systems and tied to a wider body of knowledge. In Shutzian terminology, this ‘body of knowledge’ shared by actors within a society or culture is termed ‘stock of knowledge’ (Wuthnow, 1991 [1984]). Shutz illustrates this concept and its place in the dialectic process:

In the ongoing experiences of the we-relation I check and revise my previous knowledge about my partner and accumulate new knowledge about him.

Thereby my general stock of knowledge also undergoes a continuous modification. (Shutz, 1964: 30)

Stock of knowledge, thus grows in the dialectical process of the so-called ‘we-relation’. As knowledge undergoes continuous modification, compounded by innumerable ‘we-relations’, it becomes specific to groups of people and places. I will refer to ‘stock of knowledge’ as it relates to the term ‘indigenous knowledge’ to denote accumulated knowledge, not just through interpersonal interaction, but through human-environment interaction as well.

Based on the assumptions that humans are ‘biologically underdeveloped’ and so create reality (the life-world, society and culture) through giving meaning to experiences, through Berger’s dialectic process, knowledge can be seen as a direct result of reality construction and *re*-construction. As such, knowledge is inherently in contention and driven by discourse in society, which constantly either transforms or further embeds it. In any case, it is always open to modification through the dialectic. Berger recognizes knowledge as something that goes beyond just the individual level, and is common to groups of individuals, societies and cultures for whom the knowledge fits into a meaning system or ‘relevance structure’. Specifically, he defines it as “objectivated meanings of institutional activity” (1966, in Wuthnow, 1991). Tying knowledge to objectivation does two things. First it recognizes that it is a result of the sociological dialectic, and second denotes that it is responsible to some degree for ordering society. Institutions, the “background of stable definitions of reality...and patterns of behavior,” are also notably influenced by a “foreground where individuals are capable of making choices, creating, innovating, and manipulating” (ibid, 43).

The extent to which I will go into Berger’s ideas about culture will go only as far as institutions as sociological structures and products of dialectic processes. It is through these bodies of behavior-patterning rules that people interact with their environments and the resources they afford. From the subjective experiences of individual agro-pastoralists’ life-worlds to the objectivated institutions that mediate their relationship with mountain meltwater, the peoples of Mustang and the Colca Valley are intrinsically conscious of their water resources. Via this reckoning, the goal of this inquiry is thus to penetrate the life-worlds of these irrigating participants and to understand their perceptions of their meltwater from their unique point of view. Next, I will discuss briefly how Bourdieu’s concepts of *habitus* and *field* add to the base of phenomenological perceptions described above.

3.3.2 Perceptions, *habitus* and *field*

Berger explains that through a *dialectic* process between individual life-worlds and society people construct a meaningful world. Bourdieu extends notion by describing a distinct dialectic between *habitus* and *field*, two concepts which inherently influence perception. *Habitus* is defined as a “system of enduring and transposable dispositions, [which] functions as the generative basis of structured, objectively unified practices” (Bourdieu, 1977, in Vedwan and Rhoades, 2001). Simply put, it is the structure of categories through which the world is cognized by individuals. This cultural configuration of the world is informed by *field*, with which *habitus* is engaged in a dialectical process distinct from Berger. Simply, *field* is defined by a human activity, and is delimited by the extent of this. For instance, agropastoralism, as a *field*, is defined by a number of “practices and strategies” that make it, broadly, a ‘way of life’. Another way to visualize it is as a range of activities undertaken in relation to something that is “at stake”, as in land and water resources utilized by agropastoralists, which upon utilization result in this technological system (Aase, pers. comm., 2008). It is also termed as “the underlying relations of struggle which produce and shape meanings and interactions and constitute their frame” (Calhoun, 1993: note 7). *Field* thus can be viewed as the contextual template upon which meanings of the *habitus* are constructed and contested. Vedwan & Rhoades portray *habitus* and *field* in terms of farmers and agriculture as a way of discussing the concepts’ relevance to perceptions in the human-environment relationship:

[The] perceptions of climatic variables, while ultimately being constrained by the finite range of their values, are more proximately structured by the intersection of the personal, objectified histories as embodied in the habitus of social actors and the field of agriculture as a repository of differential practices and strategies (113).

The concepts of *habitus* and *field* show that the foundation of perceptions is a combination of people’s culture—their meaning systems and conceptualizations—as well as the activities they are engaged in. This supports the assertion that through people’s perceptions of the environment, we can achieve a deeper understanding of the cultural meaning systems of mountain agropastoralists in the context of environmental change.

3.3.3 Aase's Modification of Peirce's *semiotic triad*

Related in some ways to Bourdieu's ideas regarding *habitus* and *field*, Aase's modification of Peirce's *semiotic triad* (Aase, 2007) takes a linguistic approach in combination with actors' social roles to understand people's perceptions.

Aase offers the three levels of the *semiotic triad* of Peirce as: the object, the sign, and the actor (in place of Peirce's *interpretant sign*). These three levels represent the way in which humans engage cognitively with the world around them. As biological beings, we exist in a world which is composed of objects that we are either able to make sense out of or not. The way in which sense is made also resembles a dialectic process because our understanding of the world is contingent upon our practice in it or experience of it. Given that our experience proves reliable to identify an object, we utilize signs to describe it. Signs in turn denote different things, which can be connoted in distinct ways. In other words, connotations reveal how we think about experienced objects in the world. Due to the actor's social status, which in turn entails certain accompanying rights and duties, we can infer the interest of the actor in the object s/he speaks of. Thus, actors understand their world based on their experience of it and the reinforcing nature of this dialectic. I will expand upon Aase's *semiotic triad* in Chapter 4, as it is a methodological approach to studying perceptions.

3.3.4 Cultural Theory Typology: the 'Myths of Nature'

Thus far, the dialectic process has surfaced repeatedly as a common explanatory thread for the creation of cultural meaning, from Steward's ideas of cultural ecology based on Marx's human-nature dialectic, to Berger's assertions regarding socialization, Bourdieu's *habitus* and *field*, and Aase's socio-linguistic model. Key to these approaches, meaning is in constant contention and is reflected in the perceptions of the individual in his/her life-world. Thompson's Cultural Theory, however, provides another angle for the reasons behind why certain meaning systems are in place in a particular locality. It says that, based on elemental 'dimensions of sociality' rather than induction from observation, "[regardless] of time or space [...] individuals always face (and, as long as human life exists, always will) five ways of relating to other human beings. This provides the foundation for the essential 'unity and diversity' of human experience" (Thompson et al., 1990: 23). Cultural meaning, thus, results

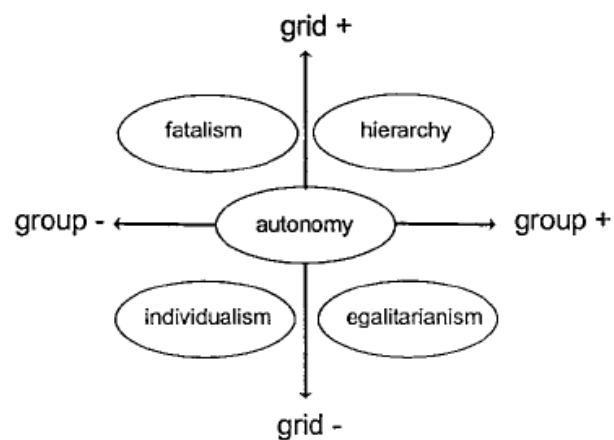
from particular preordained culture types classified by how each cognizes the ‘natural world’, or those ‘hard surfaces’ on which all of humanity and life on earth depend and hold in common. Through these five ‘ways of life’ and the cultural bias and range of social relations justified by each one, Cultural Theorists posit that perceptions of phenomena result from the ‘myths of nature’ contended for by each type. The typology of ‘ways of life’ and their myths are discussed here.

The five ‘ways of life’ proposed by Thompson et al.’s (1990) Cultural Theory derive from Mary Douglas’ two ‘dimensions of sociality’: *grid* and *group*. These reflect general characteristics of behavior and social arrangements common in all cultures and societies.

Grid is described as “the degree to which an individual’s life is circumscribed by externally imposed prescriptions”. Moreover, “[the] more binding and extensive the scope of the prescriptions, the less of life that is open to individual negotiation” (ibid: 5).

In other words, grid is the level of social regulation present in a social context, which can be said to influence the level of inequality or equality in a given society. ‘High grid’ denotes “an explicit set of institutionalized classifications [that] keeps [individuals] apart and regulates their interactions” (Douglas, 1978 in Thompson et al., 1990: 6). It is characterized, further, by inequality. ‘Low grid’, is where “individuals are increasingly expected to negotiate their own relationships with others” (ibid), resulting in greater individual equality. *Group*, on the other hand, describes “the extent to which an individual is incorporated into bounded units”. In other words, “[the] greater the incorporation, the more individual choice is subject to group determination” (ibid:5). This axis runs along a continuum from no competition within a group to high competition, based on the level of boundedness of the group. In other words, ‘high group’, approaching no competition, denotes a social context where an individual is bound and “sustained by group membership”. The “further one moves along the group dimension, the tighter the control over admission into the group and the higher the boundaries separating members from

Figure 3.1: The Two ‘Dimensions of Sociality’ and the ‘Ways of Life’ of Cultural Theory
 (From Thompson et al., 1990 in Mamadouh, 1999, Thompson and Gyawali, 2007, Mamadouh, 1999)



nonmembers” (ibid:5). This is the case of a structured society. ‘Low group’ is the opposite of this situation, and synonymous with high competition because individuals are not bound as tightly by group membership. To visualize four of the five ‘ways of life’ resulting from the interplay between grid and group, the social dimensions are represented by intersecting lines on a Cartesian-like plane with four quadrants delimiting the space containing each possible ‘way of life’. The conventional labeling of these include the *individualists*, *hierarchists*, *egalitarians*, and *fatalists*²⁰. The fifth ‘way of life’, the *hermit* or *autonomist* is proposed to be the result of a third social dimension, ‘manipulation’ or ‘grip’, intersecting at the zero-point of the other two dimensions. However, “[t]he third dimension is concomitant of the other two... [t]herefore it can be ignored in a parsimonious model” (Mamadouh, 1999: 399). The ‘ways of life’ in their relative positions within the grid-group model is illustrated in Figure 3.1.

Thompson et al. (1990) add that these ideal ‘ways of life’ are reducible to five and *only* five because their viability “depends upon a mutually supportive relationship between a particular cultural bias and a particular pattern of social relations” (ibid: 2), termed the *compatibility condition*. The authors continue, stating:

...[a] change in the way an individual perceives physical or human nature, for instance, changes the range of behavior an individual can justify engaging in and hence the type of social relations an individual can justify living in. Shared values and beliefs are thus not free to come together in any which way; they are always closely tied to the social relations they help legitimate.
(ibid: 2)

Illustrated is a situation where individual perception must result from the types of social relations he/she justifies living in. The individual’s perceptions should in turn rationalize a

²⁰ It is important to note that in different studies employing grid-group cultural theory the different ways of life have been assigned various different labels. For instance *individualism* has also been called *competition*, *entrepreneurs* and *market*; *Hierarchy* called *collectivism*; *Fatalism* called *isolate*, *insulated*, or *atomized subordination*; *Egalitarianism* called *factionalism*, *sect/sectarianism*, *enclavist*, *dissenting groups* and *communards*; and *the Hermit* called *autonomy-ist* (Mamadouh, 1999). This variety in labeling or lack of standardization can become confusing “because labels stimulate our imagination so readers tend to forget about grid and group and fill up the quadrant with the connotations of the labels [and] also because of the inconsistencies in label use” (ibid: 401). In other words, “[I]abels matter because they transmit different connotations” (ibid: 402). The different labels, furthermore have implications for the level of analysis, whether social relations, cultural bias or behavior. This will be discussed in the chapter on methodology.

particular range of behavior acceptable to the characteristic social relations. In this way, and “across a wide range of phenomena [...] social relations generate preferences and perceptions that in turn sustain those relations” (ibid: 2). A dialectical ‘social construction of reality’ thus emerges in this current of social theory, tending toward preordained, self-legitimizing types of culture. While the ‘ways of life’ are reasoned to “channel the thought and behavior of individuals” (ibid: 2), including but not limited to perceptions of natural phenomena and reactions to these, behavior and social relations serve to justify this ‘guiding’ of social formation. Despite the fact that this approach to culture is functionalist and could easily be disregarded by critics claiming it too deterministic, Thompson nonetheless defends that the myths of nature, themselves “‘social constructions of reality’ are so predictable and so enduring that natural resource ecologists have been able to deduce them from the recurrent regularities within the managed ecosystems they study” (Thompson, 1995: 32-33). He continues: “the followers of each way of life tend to choose those possible states that best support their way of organizing and most discomfort those of the rival ‘ways of life’” (ibid: 32). Through this competition or discourse in support of a ‘way of life’, individuals buttress their own way by pushing away from the four others (illustrated in Fig. 3.1). But each one needs the four others to define itself against, and as reinforcement for the rationalization of their own ‘way of life’.

The ‘ways of life’ have supporting ‘myths of nature’ or a particular way of perceiving the world which supports their behavior and social relations. The myths are each visualized as a ball on landscapes with differing terrain, the behavior of which shows how nature is viewed by each group (Figure 3.2). Furthermore, the ball’s ‘behavior’ corresponds to the varying degrees which the two dimensions of sociality are manifest in through the cultures’ ‘myths of nature’. First, the *individualists*, with low group and low grid, tend toward more equality between individuals, but a higher level of competition. They are considered ego-focused networks, “bound by neither group incorporation nor prescribed roles” (ibid: 7). Traditionally within the social sciences, individualism is associated with markets since this ideal culture type “institute[s] equality and promote[s] competition” (Thompson, 1995: 32). They see nature as benign, which is represented by a ball in a valley, where any disturbance or movement of it (nature) means it will roll back to a ‘stable state’ again.

The outlook of *hierarchism* differs due to its limiting of competition and the institutionalization of inequality. The hierarchist’s “social environment is characterized by

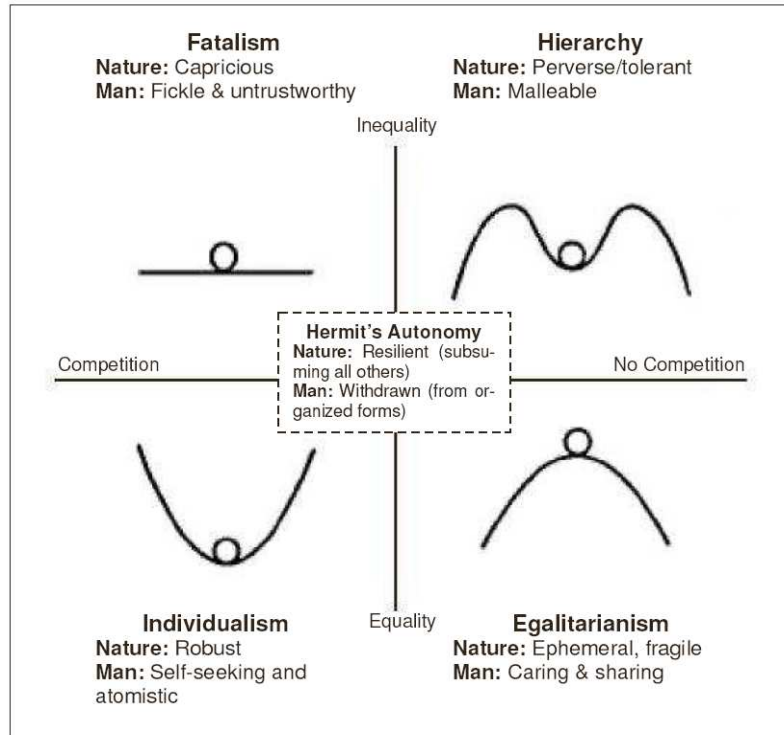


Figure 3.2: The typology of cultural types according to Cultural Theory

Above, the ‘ball-in-landscape’ illustration of the ‘myths of nature’ is presented. Each myth in turn suggests a particular attitude held by humans (shown as ‘man’ above). These attitudes are traceable in people’s perceptions as an individual expression of the group’s myth.

(Adapted from Thompson, 1995, Thompson and Gyawali, 2007, and Mamadouh, 1999)

strong group boundaries and binding prescriptions” (ibid: 6) where “the exercise of authority [and inequality] is justified on the grounds that different roles for different people enable people to live together more harmoniously than alternative arrangements” (ibid:6). Nature is viewed as tolerant in the same sense as the individualist, yet it is also as perverse (illustrated by a ball in an open valley where it could potentially ‘roll off’ if pushed too far—beyond central control). As Thompson (1995) states, hierarchists are “those who are in the business of controlling” (ibid: 30), citing the element of nested power denoted by their title. “[W]henver possible” he continues, they “see things in a way that renders those things susceptible to control: inherently fixable by those with the requisite knowledge and organization” (ibid: 30). If a disturbance causes instability in nature, it can return to a stable state, but could also fall out of balance. But as long as there is organizational control, things can be held in order.

Egalitarians are characterized by equal relations (low grid) and no competition (high group). “Strong group boundaries coupled with minimal prescriptions produce social relations” (Thompson et al., 1990: 6) in this category. Moreover, behavioral role differentiation is minimal, helping to bind the group together in “shared opposition to the outside world” (Mamadouh, 1999). They see nature as ephemeral—any imbalance or disturbance could be catastrophic. The deep ecologists are an example of a type of this group. To them a “problem [can be] so serious as to be beyond the reach of both markets and hierarchies” which are actually a part of the problem in the first place (Thompson, 1995: 32).

The *fatalists*, plagued by inequality and competition (high grid and low group) are the “[p]eople who find themselves subject to binding prescriptions and are excluded from group membership” (Thompson et al., 1990: 7) altogether. At the margins of organized cultural categories such as hierarchies (Mamadouh, 1999), they are “controlled from without [...], their sphere of individual autonomy is restricted [and they] are excluded from membership in the group responsible for making the decisions that rule their life” (Thompson et al., 1990: 7). Thus their view of nature is pessimistic; it is not seen as benign or even perverse but rather is regarded as capricious and unruly. The ball is stuck on a flat horizon unmoving; it can change at any moment and anything they do to it couldn’t make any difference anyway. Fatalists blame, as the etymology of their name suggests, fate, and are essentially at the whim of the workings of the world.

When and if recognized (as there is some debate over whether it exists (Mamadouh, 1999)), the fifth culture type is the *hermit*. Sometimes it is not even considered a specific type, but rather an “extreme form of low grid position” (Mamadouh, 1999). Regardless though, this group “withdraws from coercive or manipulative social involvement altogether [and] escapes social control by refusing to control others or to be controlled” (ibid: 7). The hermit pulls back and finds “overlooked corners closer to hand that none of the engaged ‘ways of life’ is able to reach”. Since he/she is unconcerned with successful returns, and conducts work more efficiently achieved individually than in a group, the hermit’s requirements are not too hard to fulfill. “His strategy is aimed at autonomy: a relaxed and un beholden self-sufficiency” (Thompson et al., 1990: 10).

Thompson describes the typology of cultures above as a scheme “in which the categories are mutually exclusive and jointly exhaustive” (Thompson, et al., 2007: xxxviii). The point of

each ‘way of life’, as implied here, is to “[supply] its followers with the convictions, the preferences and the moral justifications that will support that way of life...and discomfort the rival ways” (Thompson, 1995 :34). Although in opposition, there is a clear mutuality at play here between the groups—or in other words, a dialectic process. But even though no one group can exist in isolation—Thompson (1990: 4) asserts that “[t]o destroy the other is to murder the self”—there is no guarantee that “every way of life will be equally represented within a single country [or for that matter a single mountain village] at a given point of time” (Thompson et al. 1990: 4).

While each cultural type cannot exist without the other, this does not mean that individuals do not change between the ‘ways of life’. Actually, it is asserted that “adherents are constantly moving from one way of life to the other” (Mamadouh, 1999: 397). This constant disequilibrium is explained by the ‘theory of surprise’ which asserts that ‘ways of life’ are resistant to change as long as the recurrent events do not overstep the expected consequence of the events. Mamadouh (1999) adds that “the cumulative impact of successive anomalies or surprises (major, painful accidents) provoke a change of paradigm” (ibid). Thus it is possible that if global warming and climate changes are invalidating the rationalities of local ‘ways of life’ in Mustang and the Colca Valley that cultural changes could be occurring. But if multiple cultures are identified in these societies—that is, if the societies exhibit a degree of ‘cultural plurality’—then it is posited that they should be less surprise-prone.

In sum, according to the assertions made by Cultural Theory, the perceptions of individuals should provide an inroad into the particular social construction of reality characterized by each ‘myth of nature’. This theory presents an interesting, nomothetic angle to the study of culture and perceptions despite being a culturist approach. I will discuss the attitudes and perceptions of Mustangis and Colqueños in terms of this concept in Chapter 7 to assess their approach to the local effects of global warming and climate change.

3.4 Summary

In this chapter, I have provided a basis for viewing people’s perceptions in a context of human-environment interactions. The environmental and culturist approaches to viewing this relationship has shown that both sides contribute significantly to the debate of whether the environment is causative of culture or whether nature is a projection of culture. Perceptions

are presented as reflecting the meaning that is created in the various dialectical processes described, from psychological, to inter-subjective, and actor-object. These processes inform how meaning is always changing within social relations and between humans-environment relations. With this perspective in mind, we can now begin to approach the problem of how cryo-hydrological changes are perceived by agro-pastoralists in the micro watersheds of Mustang and the Colca Valley.



Photo 6 Irrigation by moonlight, Dhakarjhong with Muktinath Himal

Chapter 4: Methods and Methodology

4.1 Introduction

In this chapter, I present the main methodologies and specific field methods used in this study to collect and analyze data. The methodological perspectives used correspond to the theoretical approaches discussed in the previous chapter. The various phenomenological theoretical perspectives require an analysis of the ‘texts’ conveyed through interviews with respondents in order to view their lifeworld. Aase’s modification of Pierce’s *semiotic triad* as well as his *categorical analysis* provide a framework aptly suited to achieving this end. Thompson’s *Cultural Theory* and Aase’s approaches both rely on perceptions and the assessment of cultural meaning conveyed therein in order to achieve their goals of explaining cultural phenomena.

In addition to the methodologies, I present the specific qualitative field methods used to collect and generate data. I will discuss the reliability of this study, its strengths and weaknesses through the discussion of the advantages and constraints of studying cultural phenomena as a cultural outsider. I will also argue in favor of comparative method as a useful approach to understanding local phenomena, perceptions and the meaning attributed to environmental changes with a broad perspective spanning culture and space.

4.2 Methodology

4.2.1 Semiology, Phenomenological Methodology and Discourses

In the previous chapter, I explained the goal of phenomenology as aiming to view cultural subjects’ cognition of phenomena through their own perspective and experience of their world—the lifeworld. Methodologically, the most direct and natural way of gaining insight into the lifeworld is through the individuals’ perceptions of it expressed through language. Through this, we can make two basic assumptions regarding the lifeworld and the nature of perception: 1) that human perceptions reflect cognitive *categories* used to localize observed phenomena; and 2) that social structure has an influence on perceptions because of social status and role. Status, furthermore, may even be said to *define* the lifeworld of the perceiving actor. Whether the social structure that a particular status is a part of is due to

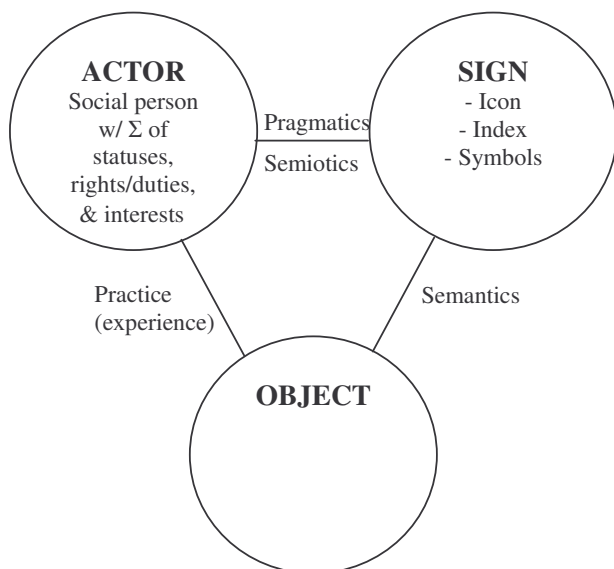
predefined types (such as Thompson’s Cultural Theory) or is the result of local socio-cultural specificity and distinctiveness should be visible through people’s attitudes and language. These two assumptions in turn have important methodological implications, which Aase details through *categorical analysis* and his modification of Pierce’s *semiotic triad*, respectively.

In categorical analysis, Aase (1997) describes categories as the product of “a systematizing mechanism, which is a universal human characteristic”. “If we did not have [such a] mechanism that could systemize these perceptions,” he continues, “the world would seem chaotic and meaningless” (ibid: 2). Thus by necessity, humans “[localize] observations in categories [to] create order in the world [and in turn] attach meaning to the phenomen[a] around us, and they become predictable” (ibid: 2). But just because all humans categorize phenomena by necessity does not imply that every society, culture or for that matter even every individual has the same repertoire of meaningful categories. In other words, “[h]ow categories are given meaning varies from group to group and from person to person” (ibid: 3). Hence, it is important to be aware that the outside researcher’s categorization of phenomena is probably not the same as a cultural insider’s. In order to understand such *emic*—native or local categorization of phenomena—Aase prescribes the following four steps (ibid: 4):

1. Map out which categories informants have in regard to a given subject;
2. Determine how the categories are constituted—how they are argued for;
3. Clarify how informants relate categories to each other through such cognitive mechanisms as narrative, metaphor, etc.; and
4. Identify the informants’ localization or contextualizations of observations

Categorical analysis, thus, aims to “uncover diverging [localizations] of [an] observation, and then...see how the categorized observations are involved in different discussions or conflicts over an issue” (ibid: 4). This will be exemplified in the varying and sometimes contradictory perceptions of changes in local water resource regimes, and the reasons and solutions for them in the upcoming chapters.

Figure 4.1: Aase’s modification of Peirce’s *semiotic triad* consists of three levels: the actor (‘interpretant sign’ for Peirce), sign, and object. The actor is a social person defined by his/her sum of statuses, rights & duties and interests. (S)he uses signs, either icons, indexes or symbols, to refer to the object being discussed. The analysis of signs aims at deciphering meaning and is cultural analysis. The study of the actor within a social structure is structural analysis, while the study of the object itself is the realm of the ‘hard’ sciences. The links between the three levels are shown here.



Aase’s modification of Peirce’s *semiotic triad* (Figure 4.1) assumes the inherent categorization of phenomena described in categorical analysis, and takes it one step further to include language and its signs (words) as indicating how phenomena are categorized. This is achieved by addressing the fact that individuals in society are part of a social structure. Actors within this structure are *social persons* who are in essence the *sum of their statuses*. A given social status imparts a unique view on phenomena because of the rights, duties and interests that

are attached to it resulting from the particular practice of the actor. In a Norwegian example a conservationist and a farmer tend to view water-logged land differently due to their diverging practices and interests in the land. Conservationists call it ‘våtmark’ or wetland, which has positive connotations, bringing to mind wildlife and biodiversity—two concepts important to the ideology of this actor. For the farmer, however, water-logged land is called ‘vassjok jord’ or water-sick land, having a negative connotation (Aase, 2007). Thus, the different actors utilize different signs which although denoting the same object, have diverging connotations based on their different practices and interests in it. To extend this further, the connotations rely on metaphors to convey the meaning of the sign or concept, allowing us to “[*understand and [experience] one kind of thing in terms of another*]” (Lakoff and Johnson, 1980: 5, original italics). This meaning will resonate culturally, because “[the] most fundamental values in a culture will be coherent with the metaphorical structure of the most fundamental concepts in the culture” (ibid: 22). So the farmer gives meaning to his experience of water-logged land by characterizing it as *sick*, and the conservationist, through her cultural lens relies on the pastoral image of a classical wetland as a symbol for a sound environment.

While practice and experience are the basis for the creation of categories in the mind, connotations reveal how we conceptualize, or think about these categories. The actor's status and ultimately culture influence their denotation of phenomena.

If categorical analysis can be said to focus on culture or the meaning ascribed to phenomena, then the analysis of the actor's position in society can be said to emphasize social structure. Methodologically, the analysis of social structure through the consideration of the signs utilized by the perceiving actor can help the researcher understand the cultural meaning attached to phenomena. Through this understanding, we can hope describe in detail the meaning and effects of cryo-hydrological changes for mountain farmers in this thesis.

As mentioned, the two main theoretical approaches used in this thesis rely upon peoples' perceptions of phenomena as the basis for gaining knowledge about socio-cultural meaning. Both will be used, although I will draw the methodological distinctions between them.

4.2.2 Thompson's Cultural Theory

The grid-group typology of 'ways of life' and their associated 'myths of nature' attempts to present a parsimonious model of definite cultural types that is universally applicable in all human societies. The theory has two versions: the 'soft', which aims to describe societies heuristically, and the 'hard', which serves as a full explanatory theory. One theoretical question of this thesis is to assess whether this theory sufficiently explains the cultural attitudes toward water resources in change in the field areas. For this purpose the soft version of Cultural Theory is better suited because the aim is not to achieve a full explanation of my respondents' views in the methodology outlined by the hard version. Nonetheless, I will present the methodological steps of the hard version to better inform my approach utilizing the soft version, which, as Mamadouh explains is "vulnerable to illustrative examples and bird spotting [or spotting representatives of each cultural bias, for the sake of spotting them], especially when the theory is used as a heuristic device without trying to explain why which actors voice which bias" (1999: 405).

The attitudes or cultural bias associated with each cultural type are the key focus of the typology of Cultural Theory. The biases that individuals express reveal the culture type to which they belong. Thus, cultural bias can be seen as an analytical focus of this theory.

Actually, Thompson, et al. (1990) outline three such levels of analysis: social relations, cultural biases, and behavior. If these three levels are mutually reinforcing for an individual, the theory states, then there is coherence in their adherence (albeit subconscious) to a particular way of life. *Incoherent* combinations are possible, but are most likely temporary. In fact, Mamadouh (1999) suggests, incoherent constellations of relations, bias and behavior may be observed more commonly because of the constant disequilibrium resulting from surprise, or the “discrepanc[y] between expected and observed reality” (ibid: 404). ‘Constant disequilibrium’ itself is an integral concept of Cultural Theory, describing the nature of competition between the ‘ways of life’ vying for new adherents²¹ and asserting that adherents are constantly moving from one ‘way of life’ to another.

If there are levels of analysis, then there must also be a scale of analysis, the hard version of Cultural Theory posits. Since human societies differ so much in their level of complexity, the level of observation should be considered. Michael Thompson argues that the theory is applicable at any scale from an individual person with a set of statuses and roles, to a village, and eventually the world. But Mary Douglas asserts that scale should be the ‘relevant social environment’ or the ‘scale of face-to-face contacts’ between individuals in their social environments (Douglas, 1978 in Mamadouh, 1999: 404). For the purposes of this study, the scale of analysis is delimited to the individual as an inter-personal member of village society.

One final methodological consideration is the nature of individuals as ‘carriers of bias’. Mamadouh (1999) explains that Douglas “has proposed a rigid interpretation in which cultural bias is a permanent characteristic of a person: it may change over time [...] but it is hegemonic, it applies to all domains in life” (404). Thompson, conversely, gives a flexible interpretation of bias, where the individual’s adherence to different biases changes depending on the context or environment the individual happens to be in (ibid.). This view, however, is criticized because cultural bias is potentially too volatile; a fact which would weaken the theory.

²¹ Mamadouh (1999: 403) adds that the culture types are characterized as either active or passive. Active (individualists, hierarchists, egalitarians) adherents “propagate their way of life [and] tend to impose their cultures on others because it is the right way to do things” while passive (fatalists and autonomists/hermits) adherents do not.

Rather than utilizing the full hard version of Cultural Theory to explain mountain farmers' perceptions, I will focus on the soft version's heuristic approach relying on the central typological model of the theory (see Figure 3.2), with emphasis on each cultural type's 'myth of nature' as expressed through individual perceptions.

4.3 Methods

For the methodologies above, I collected data using qualitative methods. Specifically, I implemented interviews and participant observation to find the differing positions and discourses used to explain the cryo-hydrological changes in Mustang and the Colca Valley.

4.3.1 Interviews

Data in Nepal and Perú were collected principally through field interviews, of which I used both structured (questionnaire) and unstructured forms. Field conversations, although very insightful when performed, were utilized only to a limited degree.

In Nepal, communication with respondents (n = 30) was limited by a language barrier since I am unable to communicate in either Nepali or the local dialect of Tibetan spoken by Southern Lobas in Mustang. My communication with locals was thus entirely dependent on local English-speaking guesthouse owners and youth²². As such, most queries in the Trans-Himalaya were limited to structured interviews. However, as I became more accepted—or perhaps tolerated—in the communities of the Lumbuk Canyon area, I was able to return to a few respondents for cumulative, unstructured and open-ended exchanges to clarify some of the points raised in the previous interviews.

Conversely, in Perú I was able to chat and discuss freely with respondents because of my fluency in the Spanish language. I encountered Quechua monolinguals on only one occasion while walking through the terraced fields of Tapay village. This elderly couple in colorful autochthonous dress would have been interesting subjects to interview, but our communication was reduced to mere hand signaling. Although I do not speak Quechua—the

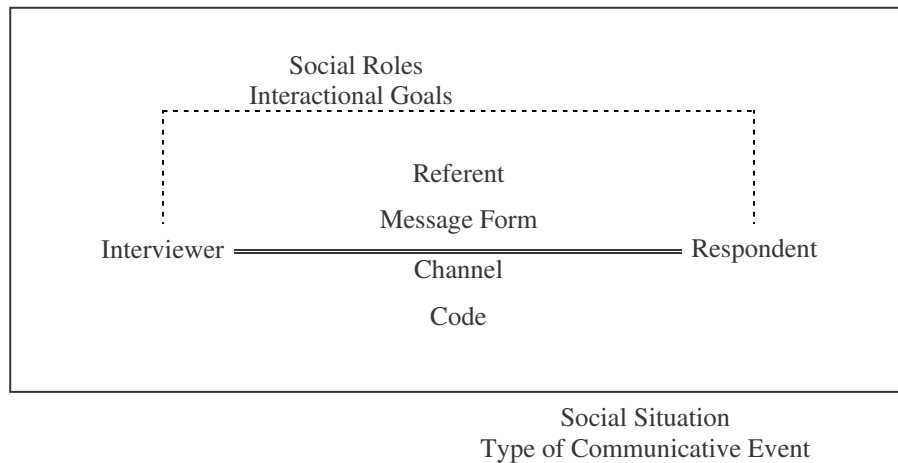
²² With increasing frequency young Mustangis are being sent to boarding schools in Pokhara, Kathmandu and other places such as India for their education where they learn English in addition to adopting aspects of contemporary urban culture.

local indigenous language and legacy of the Inca Empire—most people speak Spanish. As such I was able to speak more in-depth with respondents (n = 14) over a shorter period of time than in Mustang. I conducted structured interviews, which many times became less formal because of the relative ease of communication. I also performed unstructured interviews and some field conversations.

However, Briggs (1986) cautions, all too often “we take for granted that we know what [an interview] is and what it produces”. In actuality, it is a very unusual communicative event that should not be regarded merely as a simple “‘face-to-face’ verbal interchange” (Dunn, 2000: 51) achieved by following simplistic steps resembling a cook book recipe (Briggs, 1986), whose end result is the transmission of a distilled ‘truth’ from respondent to interviewer. This misconception resulting from the mystification of interviewing neglects three important facts about the nature of the interview. First, interviews are “native metacommunicative events [...] rich in the pragmatic features that root speech events in a particular social situation and imbue them with force and meaning” (ibid: 2). Second, upon agreeing to participate in an interview, interviewer and respondent “implicitly agree to abide by certain communicative norms which moves the roles that each party normally occupies in life to the background”. This removes the intersubjective context of the interview as a jointly produced communicative event. Lastly, oftentimes, due to a gap in knowledge of the socio-linguistic norms of the respondent (an interview may not be a communicative form present in a particular culture), the fieldworker “fail[s] to see how native communicative patterns have shaped responses [leading] the researcher to misconstrue their meaning” (ibid: 2-3). The researcher should thus try to understand the meaning of the interview as categorized by local respondents in order to better comprehend responses, and furthermore avoid occulting the normal roles constituting the status of the interview participants. The importance of status and role in interviewing will be discussed later.

Since many fieldworkers may never escape this “methodological naiveté” (ibid), understanding the contextual richness of the interview event is imperative in order to expand our understanding of the information collected in the qualitative research process. Using the three above considerations, Briggs presents a framework developed and expanded by Jakobson (1969) and Hymes (1964, 1972), respectively (see Briggs, 1986), to analyze the components of an interview “in order to pinpoint the sources of different types of

Figure 4.2: Jakobson's & Hymes' components of the interview situation (in Briggs, 1986: 41)



communicative difficulties encountered in interviews” (ibid: 40). These components are illustrated in Figure 4.2.

Interviewer and *respondent* are the primary participants of the interview. The participants present during interviews varied from household to household, but other people in addition to the primary respondent were common. When possible, the multiple viewpoints sometimes expressed by onlookers were noted. In Mustang, all interviews were mediated through an interpreter, limiting my ability to communicate to a degree. However in Perú, I was able to sit down and talk intimately with Colqueños one-on-one.

Message form refers to the sign vehicle(s), whether auditory or visual, used to communicate between interviewer and respondent. In Mustang and the Colca Valley, communication was chiefly pursued through speech. However, in Mustang I also utilized photographs as a visual form of inquiry. Such *photo induction* of conversation allowed me to ask about specific features of the landscape, agricultural land or irrigation system without having to struggle, with my meager outsider’s vocabulary, in referring to the specific object I was interested in.

The *referent* is the ‘object’ of focus in an interview, as in Aase’s modified *semiotic triad* (see Figure 4.1). Since “the cognitive or *referential* function of transmitting information is dominant in interviewing” (ibid: 40; italics by author), it is important to establish local categories in order to maintain reference in an interview. This was a major challenge during fieldwork, but as I learned local names for objects, such as *yura* (irrigation canal) and *tsingu*

(irrigation reservoir) in Mustang, and *purmaketke* (permanent snow) in the Colca Valley, I was able to learn more about changes affecting them.

Channel refers to the physical and psychological “circuits” between interviewer and respondent, including the flow of both verbal and non-verbal signs. Although it is “possible to obtain verbal exegesis in most cases”, Briggs says, the non-verbal referential forms are important means of conveying meaning through “a more comprehensive semiotic” (ibid: 44). *Code* is related to channel, but refers to the specific verbal and non-verbal conventions of communication defined culturally, which the participants of the interview must share in order to communicate successfully.

The *social roles* of the interviewer and respondent are also of crucial importance to the success of an interview. In this model, Briggs discusses *social roles* in terms that more closely resemble the *social status* of concern in this thesis. Thus, I emphasize the distinction between *social status* and *role*, because they correspond to different analytical levels: *social structure*, and *social organization*, respectively (see Figure 4.1). Nonetheless, social roles and statuses affect communication between individuals because of the expectations they raise for behavior of interviewer and respondent, and between them. The more the social roles and statuses of interviewer and respondent fulfill each other’s expectations of conduct, the more trust is fostered in the relationship, which can be of value in accessing an individual’s perceptions.

The *interactional goals* or the motivations of interviewer and respondent for participating in the interview are also important factors because, as Briggs notes, for each participant these are commonly divergent (ibid: 41). He adds that “the respondent’s orientation toward the interaction as a whole may inform his or her responses” (ibid: 47), thus awareness of their intentions for responding in a certain way will give insight into *their goals* in the interview. Although a respondent may agree to sit down for an interview does not guarantee that his or her motives correspond. For instance, in Nepal, after interviewing a willing respondent, I realized that he had hopes that I would bring the village financial aid for development.

The *social situation* describes the context, including time of day and even season, the social setting of the interview, activity, the number of individuals present, etc. As mentioned, some interviews were held between just the respondent, interpreter and interviewer, but at times the

respondent's family or friends were present. These contextual factors will ultimately come to bear on the information, or lack thereof, that is imparted during the exchange. Finally, the *type of communicative event* refers to the category of communicative interaction the interview will be located in for the members of the society where the interview takes place. As mentioned earlier, the interview is an unusual communicative event, largely because it does not fit into many societies' native communicative frame.

The different components of an interview situation are important factors to take into account in order to avoid communicative problems which can impede and disrupt interviews, "rendering the analysis of the data a most precarious enterprise" (ibid: 39). Whereas interviewing, as a qualitative method, can all too often fall victim to the ill effects of attempted standardization of communication—which is anything but standard, participant observation can help to hone in on the contextual meanings of speech. I now turn to this.

4.3.2 Participant Observation

Kearns (2000) states that participant observation "is concerned with developing understanding through being part of the spontaneity of everyday interactions" in a society (108). By nature, this method provides the potential to break out of the communicative dilemma that the standardized interview places the interviewer into and overcome many of the problems outlined by Briggs above.

By being part of the "spontaneity of everyday interactions" the researcher can 'get backstage' or come to understand concepts and categories from the individual's perspective in the 'lifeworld'. Kearns adds that "conscious participation in the social processes being observed increases the potential for more 'natural' interactions and responses to occur" (ibid: 109).

Through participant observation, the researcher begins a process of 'naturalization' or integration into the host society (s)he is studying. The aim of this process ultimately is to understand the emic categorization of phenomena within a society. Even if just for a short time, an 'outsider' can gain an 'inside' view informing of the nature of a particular social practice. This was the case in Mustang when I participated in the *yura* (irrigation canal) and *tsingu* (irrigation pond) cleaning with villagers from Dhakarjhong, and on another occasion accompanied them, along with villagers from other villages in Lower Mustang on a

pilgrimage to the local ‘Guru Rimboche’ shrine, *Lumbuk* (see Chapter 2). Most of the community members participated in these events, both of which were ritualized and accompanied by *shyapten*, or lama led prayer ceremonies. Observation and participation in the distinct events demonstrated the importance and rational function of prayer as fostering community solidarity in two activities as different as ditch cleaning and pilgrimage. This would have not been as clear to me had I not engaged in these “spontaneous everyday interactions” with locals.

But, as I have mentioned, participant observation and coming to understand local emic categories consists of a ‘naturalization’ process, which itself entails achieving locally recognized status within the community. In the following section, I will describe the transformation of statuses I experienced while performing fieldwork and how I myself, as a phenomena or event in Mustang and the Colca Valley, was ultimately categorized, understood, and trusted or not.

4.4 Status & Role

In research involving interviewing and face-to-face interaction with respondents, the researcher’s local status in the field as perceived by the respondent community can influence the quality of information gathered. Briggs discusses the importance of status, and the role expectations it raises in the context of an interview above. But since cultural research involves more than just interviewing, namely participant observation, awareness of status should be extended to this wider realm.

What status(es) did I have in Mustang and the Colca Valley? In both places, tourism is an important aspect of the local economy, and most Westerners who visit are automatically located in this category. Since Dhakarjhong, Phalyak and Pakling are located ‘off the beaten track,’ they receive almost no foreign visitors. Nonetheless, on my first visit to the villages with one of my interpreters who is a guesthouse owner, I was immediately spotted as a tourist. This was due as much to my experience as being with a guesthouse owner. We passed an old farmer ploughing his potato field who yelled out to me, “*mithaii!*”, or candy in Nepali, facetiously. No child anywhere in this corner of the Himalayas would let a tourist cross their path without asking—*begging*—for candy! On one occasion, even after I had spent

significant time in Dhakarjhong, a father demonstrated with me to his small toddler how to ask a tourist for sweets!

Much of my behavior in the villages was what the locals would expect of a tourist: picture taking, absurd gesticulation, walking around with a look of dumb wonder on my face, etc. However, when I started taking out pen and paper and asking locals strange questions about water, they remembered other like characters who had done the same sometime before. I was told about a group of Japanese students or researchers who visited the Lumbuk area to interview the locals, but about a different theme. Thus, my behavior was recognized and re-categorized. “He is like those Japanese people who came,” my interpreters would even explain to my respondents, typing me further with this label. People now expected me to ask questions, but they were still not necessarily comfortable with responding. One day, I was interviewing an elderly man about the changing cryo-hydrology of the area in the Dhakarjhong community hall. Many other individuals gathered around to listen in on the interaction that was occurring. People asked why and what I was interviewing people about. When my interpreter explained that I would write a ‘book’ on the information the people were giving me, one man started talking-up a storm. The expression on his face shifted between perturbation and edgy humor. He told the villagers I would probably get rich off of the information they were giving me *for free!* “He says you will be just like the Frenchman who made the movie ‘Himalaya’,” my interpreter told me. He explained that the people of Dhakarjhong felt bitter about the film’s success, because Dolpo, the neighboring highland district to the west where it was filmed, still experienced abject poverty with meager livelihood opportunities, while the filmmaker earned wealth and international fame. Would his cautioning come to bear on the quality of responses in my interviewing? Beyond the effect that this statement had on my subsequent respondents, it highlights an important ethical consideration for this and other similar studies, which I will discuss in the following section.

I decided not to dwell on my apparent guilt-by-association in Dhakarjhong and moved on, trying to interact with the community in other ways. One day I arrived in Dhakarjhong and discovered to my surprise a wedding ceremony. A procession of traditionally dressed elderly women singers and drummers pounding on large hollow-trunk goatskin drums paraded the couple through the dark, labyrinthine streets of the village. When the groom passed me, he asked where I was from in English. When I explained I was from the United States, he immediately invited me to enter his home with the rest of the villagers. Dhotak had been

living and working in Brooklyn, New York City for seven years, and had returned to Dhakarjhong just to find a bride. To encounter an American citizen in his remote home village struck a deep cord with him. He spoke proudly of his 'green card', his new nation, and called me his 'countryman'. For him, ethnic and cultural lines were erased between us, since we were *both* from the United States! I felt I became something of a symbol to him. By bestowing me with a ceremonial scarf he wrapped around my neck, he honored me as his 'life-long friend' on a village pilgrimage to the Lumbuk shrine with the whole community at hand. As Dhotak's friend, I had earned more prestige than being a mere tourist. However, this status required I be a guest of honor in his house and in his presence. This still did not correspond well with my persistent researcher side, but at least people seemed to be more comfortable with me with time, and I eventually cultivated several other friendships with locals during my stay in the field.

My status in Colca, like in Mustang, also began as tourist, however my fluency in the Spanish language allowed me to befriend locals much more quickly and break out of that particular stigma. Tourists are often called *gringo*, a derogative originally from Mexico referring to North Americans. Used in South America, however, the term loses its negative connotation and just denotes any light-skinned person from the global north. A few locals called me by this, but there are some obvious problems with the label when the *gringo* speaks fluent Spanish. Did they reach a conclusion too soon? I could also be a white *mestizo* from Lima who they mistook for a *gringo*! When I explained that I was a student investigating local hydrological changes and irrigation, people's impressions changed. Just as in Mustang, I was not the first researcher the villagers had encountered (see for example Gelles, 2002 and Paerregaard, 1994, 1997), and judging from their willingness to participate in interviews, this was not an unknown communicative form. So, the Spanish-speaking *gringo* student, although an outsider in Cabanaconde and Tapay, was ultimately trusted to a degree, given the merit that this status afforded him.

4.5 Ethical Considerations

In social science research, wherever research is conducted in the world, we inevitably face the dilemma of whether or not the information gathered for data is a form of exploitation. Certainly, the man who cautioned the villagers in Dhakarjhong about talking to me because to

him I was gleaned the community of something inherently ‘valuable’ saw my questioning in this way.

Is there a way to avoid this perception on the side of the human subjects of an investigation? How can we learn something from people who are the topic of study without ‘taking’ or ‘stealing’, ‘cheating’ or ‘exploiting’ them? The answer to this ultimately resides with the researcher and with his/her understanding of fairness and reciprocity or other meaningful ways of legitimizing the transfer of information, which any scientific research reduces to.

In the villages I visited, both in Nepal and Perú, I gave back in the simplest way I could given the awkward status I held in the villages as an outsider: by being a paying guest. Wherever I stayed, whether at a hotel or a private residence, I contributed to the households providing me with food and shelter. In gratitude of the hospitality offered to me by the family I stayed with in Dhakarjhong, I also gave gifts upon leaving the field to show that the time I spent was not just an economic transaction or a ‘robbery’ where I stole people’s knowledge, but a respectful human exchange. These measures are only small compensations for the wealth of knowledge, as well as time it took to convey this information, which people so generously offered me in Mustang and the Colca Valley. Despite this, in research, we must always reciprocate as best as we can to the peoples who help us on the path to knowledge, and preferably in terms that are meaningful to them that do not compromise the information collected.

4.6 Comparative Method

As a final methodological note, the comparison of the cases of Mustang and the Colca Valley provides an opportunity to understand the effects of cryo-hydrological change on mountain irrigation communities in a broader scope. Although the two areas are totally different culturally and are located on opposite sides of the globe, their comparison has highlighted some important and interesting symmetries and asymmetries. The identification of such parallels can aid in a more complete analysis of this global problem as a process manifesting in the world’s myriad localities. Comparison as a method thus presents the possibility not only to increase our understanding of two different cases, but to discover whether the insight it produces supports a more nomothetic—‘totalizing’ or ‘universalizing’ (Thompson *et al.*, 1990, Steward, 1955)—or more idiographic—particularizing (Aase, 1997, 2007)—vision of this global process.

4.7 Summary

In this chapter, I have outlined the methodologies and methods used and provided a rationale for comparison between two cases. I have also discussed the limitations and challenges encountered while performing this cross-cultural investigation. In the following sections, I will present the analysis of the various perceptions and stories collected from the locals of Mustang and the Colca Valley about the effects of global changes affecting their increasingly fragile mountain meltwater resources.

PART II: PERCEPTIONS OF CHANGE

The theories about the wider meaning of perceptions and my methodological approach utilizing semiotics provide the basis for the analytical discussion of the data collected in Mustang and the Colca Valley. In Part II of this thesis, I begin each section with an excerpt from my field notes to demonstrate my own positionality in each location, and my journey towards participant observation, to retrace my steps as I approached my subjects and the places in which they speak.

Through people's perceptions of local cryo-hydrological changes, we can achieve a finer-resolution picture of how local climates and hydrologies are affected by global climate change and warming. But perceptions of changes are derived ultimately through the filter of the individual farmer-herder's 'experienced reality'. His or her perceptions are more than just featureless accounts of change. They are textured stories filled with meaning signaling a broader contextual influence. They disclose the particular perspective of reality—the understanding of meaning—of the individual in their experienced world. Aase and Thompson would argue that perceptions describe not simply the phenomena in question, but the angle with which the individual casts them in their social context. Whether that context or structure is the result of local social structure or preordained 'ways of life' will be discussed in Chapter 7. Perceptions disclose local environmental subtleties as much as they reveal local socio-cultural nuances. The aim here is not just to extract and categorize the environmental details of the problem of global climate change and warming, but to understand them in the context of human experience and meaning systems.

In the following two chapters, I present the changes Mustangi and Colqueño agro-pastoralists are experiencing in their cryo-hydrological systems, and attempt to draw forth the *meaning* these changes have for them. This is achieved by presenting the perceptions of changes, the reasons attributed to them, and the past and future solutions people have for them.

Chapter 5: Mustangi Perceptions

Field Notes, April 15, 2007:

In late April the Kali Gandaki River is running ash-gray from glacial debris from Upper Mustang. The river was still low enough for Dara and me to cross it on a makeshift log-and-sandbag bridge that locals from Kagbeni placed at a narrow point in the channel. The water rolled and tumbled southward on a sinuous path through a broad cobblestone riverbed flanked by steep, arid mountain slopes which guided the eye up from the river toward the serrated, snow-capped Himalayan peaks high above. 7,061 meter-high Nilgiri Mountain, like a heavenly iceberg fallen to earth glistened brightly in the morning rays to the south, framed perfectly by the V-shape of the Kali Gandaki gorge.

We traversed the steep western flank on a narrow trail leading to Pakling, Phalyak and Dhakarjhong. As we hiked along, gaining altitude over the river below, Dara mentioned that over the past few years, there had been so little water for farmers in Dhakarjhong and Phalyak that they were forced to let many fields dry up. He explained that the situation was so dire that there was even an instance in Dhakarjhong where the groom in a recent wedding was given a shing—a field for planting—as the dowry from his new father-in-law, but without the water rights to irrigate the land! Needless to say, conflict ensued. But this year, he added on a positive note, everyone had been celebrating because it snowed so much in February. I pictured the villagers I had yet to meet having big feasts in honor of the snow. Visions of little children throwing snowballs and locals eating yak stew created a hopeful picture in my mind as we headed toward the isolated villages for the first time...

Weeks later, after having met and spoken to many of the villagers, I learned of their concern for a changing environment and uncertain future. The snows had come later this year, promising a good kar, or early spring to summer growing season. But they expressed grave doubts for nak, the summer to fall growing season, because the snow hadn't had time to harden. It would melt faster than if it had fallen in December or January. There was little more people could do but pray for summer rains...

-Dhakarjhong, Mustang, Nepal



²³ *Chu* (Tibetan) water, in Tibetan script

5.1 How is Change Occurring?

In order to understand the severity of global-warming-related changes in this study, it is important to access local experiences of it. Have variations in rain and snowfall been within or beyond expectations? Has temperature? The availability and quantity of water? This section presents the environmental awareness Lumbuk villagers have of both climatic changes and changes in water. It is helpful to treat water as both an *element*—that which falls as rain and snow and courses through rivers, seeps out of springs and is affected by climate—and as a *resource*—what people *use* it for—in order to understand both salient natural changes and changes having an impact on livelihoods and daily needs. This distinction has helped to invoke a more complete picture of the changes occurring, as Vedwan and Rhoades (2001) advocate through their use of Bourdieu’s habitus and field.

The significance of water resource changes provides a window into how people think about and react to environmental change. The meanings attributed to these changes can help show how people will be affected by them. Since water resources are of such fundamental necessity to rural livelihoods, changes in these should prompt a degree of cultural response. The aim of this section is to determine the magnitude and trajectory of this socio-cultural response to environmental change and help to answer the question of how such contextual change impacts Mustangi mountain farmers and their irrigation.

5.1.1 Climatic Change

Precipitation Change

Precipitation in general was said to have changed in that there were less heavy precipitation events and that the onset of seasons with precipitation (winter, and summer) are less punctuated now. One respondent only observed a decrease in precipitation in the last 2-3 years. He, however, had only lived in Dhakarjhong for 8-9 years.

Rainfall specifically was observed to have declined, falling less in the summertime. One respondent observed that the period of rainfall had actually lengthened though, but this was said to be because what should have been winter snow fell instead as rain as a result of higher temperatures. Snow was mentioned more frequently than rain, suggesting its overall

importance in the water cycle in Mustang. In this arid trans-Himalayan valley, stored high mountain snow translates into life-giving snowmelt in the summer months. While few respondents said snowfall always fluctuates and that it has not changed, 83% (n = 30) of responses about snowfall (a majority)²⁴ described abnormal changes. Recalling further back in time, it was stated that at present there are fewer big snowfall events, simply less snowfall, later snows and a reduced snowfall season (now only 1-2 months long). Several respondents recalled either experiencing or having heard of a snowfall event which occurred roughly 30 years prior when it snowed so much that in Dhakarjhong people had to cross each other's roofs to walk from one end of the village to the other. Rinzin (27), one of my interpreters, also mentioned an avalanche that occurred eleven years earlier which reached the edge of Dhakarjhong bringing a lot of debris with it, including many junipers. He remembers the villagers later scavenging the uprooted trees for firewood.

Some individuals pointed out that there is less high mountain snow and less mountain ice accumulation, and others noted that the snowpack melts entirely by July now, whereas before there used to be snow on the mountain above the villages year-round. How quickly the snow melts, Tenzing Gurung (37) of Phalyak explained to me, depends on the timing of snowfall. If it snows in December or January, then there is time for it to freeze. It will also melt more slowly. But if it comes later, like in February as it had this winter, then it will melt more quickly because the snow would be "softer". This was of concern to villagers worried about experiencing a shortage during, *nak*, the summer growing season, for the buckwheat or *kiapre* crop.

In sum, the villagers paint a picture of precipitation in change, using various indexes such as timing, frequency and intensity of events to chart the changes specified. 93% of respondents gave some sort of response noticing a change in precipitation compared to the past.

Temperature Change

The prevailing sentiment about temperature is that the past was much colder than the present, and that the temperature had increased substantially. Older informants noticed the change

²⁴ This figure refers to responses *only regarding snowfall* which represent 43% of total responses, also a majority

because now they don't have to wear heavy winter clothing, like the *chuba* or *sumbha*²⁵. This was a good change for some because warmer temperatures are more comfortable than the cold. People did note with concern, however, the effect the higher temperatures have on mountain snow, jeopardizing the *nak* growing season.

5.1.2 Source Changes: Water as 'Element'

Stream-level Change

The villagers have a very good idea of stream level changes because it is the source for their irrigation water. Additionally, they must cross the creek in order to go between Phalyak and Dhakarjhong on opposite sides of the *lungba* or the small canyon through which the stream flows, so they know by experience—by stepping in the stream—how the level of water changes. 87% of respondents (n = 30) agreed that the *lungba* had less water now than in the past. One stated that the stream had only a little less water, but this contrasted to several other villagers' responses noting that they no longer needed to build a bridge over the stream in order to cross it anymore, especially during the spring and summer seasons when this study was performed. A Phalyaki woman specified to me that there is less than half as much water in the stream now as before, in general. At the time of my visit to the Lumbuk area, there was no water flowing below the path crossing the *lungba* between Phalyak and Dhakarjhong. The river only reemerges as a spring above Pakling.

Other respondents remembered that the stream used to flood in the past, and that it had been several years since it had done so. I was told about the tragic event many years before of a young woman who was killed in a flood that tore through the Phalyak stream and washed away the grinding mill she was using. Now, however, it was noted that there is less water in the Phalyak stream today.

Minority opinions included that the river level is the same as before, the level always fluctuates, and one respondent added that the river had not changed even as far back as 'ancestral' times. A few other respondents felt so positively about the recent snows in February 2007 that they emphasized that the river was the highest it had been in the previous 3-4 years. In such a dry place, their enthusiasm is well-warranted. These represent an

²⁵ (Tib.) a heavy woolen robe, and heavy animal hide boots, respectively

important group of perceptions, even though they are few, providing another local angle on how people view a fluctuating environment. These respondents may register the same changes as those shown above, however due to the fact that the Lumbuk area is an arid place, and because scarcity is embedded in popular accounts of the area (which will be exemplified in section 5.2), they seemed unconcerned by such ‘natural fluctuations’. This attitude is suggestive of the Thompson’s *individualist* ‘myth of nature’. In all, responses indicate significant shifts are occurring in Lumbuk’s cryo-hydrological regime.

Spring Water Change

Before arriving to the field area, I was not aware that the villagers used area springs for drinking water nor that the springs above Dhakarjhong, called *Chorataktak*²⁶ (see Lumbuk detail map, Figure 2.2), had received a lot of attention recently since they had been drying up over the previous two years. This event attracted everyone’s attention and was mentioned commonly when issues of water were discussed.

The principle observation was that there was less flow in the springs compared to the past. Regardless, some observed no change in the amount of water compared to memory, as was the case of a Dolpo migrant who had not observed any change in the amount of spring flow since his arrival five years prior. Although not a very extensive period of time, this at least shows that significant changes may not have occurred recently. Dolpo migrants, however, are sometimes reluctant to respond since as sharecroppers they are excluded from village decision making processes. Thus, the sharecropper status has an effect on response.

Again, it was suggested that the springs always fluctuate. Some individuals stated that the water sources were the same in the past regardless of the fact that they had been observed to be drying recently. This observation, I should note, was of a Phalyak resident. At the time of this study Phalyak was not experiencing the same level of spring-drying as Dhakarjhong was. A Pakling resident noted interestingly that the small spring that they use for drinking water on one of the flanks of the *lungba* above the village no longer pooled since the drinking water system had been installed in a development project in a previous year.

²⁶ (Tib.) ‘above the mill’; *chora*= mill; *tak*= up.

5.1.3 Resource Changes: Irrigation and Drinking Water

Another important point to take into account in regards to perceiving changes in water resources is that, especially in the case of historic Dhakarjhong-Phalyak water sharing conflicts, perceptions differ depending on where individuals are from. Thus village origin also gives status. Although residents of the Lumbuk villages notice how changes affect, for instance, irrigation infrastructure in a similar way, the way they talk about the historical changes in water resources differs.

Irrigation Water - Present:

Regarding present availability of irrigation water, most respondents felt positively about the increase of water from the recent snows. I sensed they were relieved by the relative abundance of water that they were enjoying at the time of the interviews. *No*, they were *not* suffering from scarcity at the present, as was clearly evidenced in the hundreds of terraces carpeted with verdant fields of two types of barley (*neh* and *chiyak*). However, many respondents had their eyes set on the mountain above the villages at the time of this inquiry, since they feared that the mountain snow would not endure through the *nak* or summer growing season, causing scarcity. This reality overshadowed the responses of even the most optimistic of respondents.

Beyond the joy over the immediate abundance, it was noted by one Pakling respondent that the *tsingu* or village earthen irrigation tank collected less water now than what he remembered. A few others felt that in general there is a growing lack of irrigation water in general. Other responses, although positive about the present abundance, brought to mind previous hard times experienced in the villages. The *kar* or winter to early spring growing season of 2007 was much better than the four-year period leading up to the present. That meant that in the previous years, people had to leave *tarko* or dry, unirrigated land. One farmer recalled that in either 2005 or 2006, only 9 *shing* (fields) could be irrigated in one day, while the normal rate in a good water year is 60 *shing* per day²⁷. Even with the potential for dry years like this, a 68-year-old Phalyak woman responded with stalwart optimism that “there’s always water in the canal, even if it’s just a trickle”, implying that regardless the amount of water, they use whatever there is, and benefit from it to whatever degree they can.

²⁷ This amounts to a watering ratio of roughly 3 out of 10 fields per day

Such responses convey a clear attitude of resilience and survival despite environmentally imposed hardship. Accordingly, some of the farmers of Lumbuk Canyon tend to see scarcity of irrigation water in terms of yearly fluctuation, and try to spread risk by banking on good years and rationing in lean ones. Thus by some accounts, scarcity of irrigation water is not conceptualized in terms of general trends per se (although some maintain that “it is always scarce here!”); one 82-year-old Phalyak man also included that “there have been problems getting water to fields for 50-60 years now”). People react to the environmental conditions they experience on a year to year basis, with a tough, ‘roll with the punches’ type of mentality. Present scarcity is buffered by the hope that there will be better precipitation in the future, and thus more irrigation water for people to use.

Irrigation Water - Past

Peoples’ experience and interaction with their water resources makes individuals conscious of the behavior of the resource, how it changes, and what affects it. But communication with elder generations and signs from the landscape, like longtime abandoned fields, inform individuals about the environmental patterns of the past. Villagers’ responses regarding past scarcity give a window as much into their impression of how things have changed as it does into their environmental ‘stock of knowledge’, which may also include for instance, information passed down over generations through oral accounts and stories.

Asking my respondents to reflect on differences between the present and past condition of water availability elicited the telling of a local myth about a mysterious *lama* called the Arya Lama (see section 5.2). The legend explains the reason behind the existence of abandoned lands surrounding Phalyak, the largest of which is called Shyamtanga (see Figure 2.2). Its presence alone is evidence enough for some to know that there *must* have been more water in the past, even for those unfamiliar with the story.

A few argued the opposite though, stating that *in the past there was much less* water, also citing Shyamtanga as evidence for this. This brings to light the question of how long these lands have been abandoned, since some reason that the drying-out started *very* long ago. One 82-year-old Dhakarjhongi woman said that there was more water only in *her grandmother’s* time. This suggests that the area has experienced some level of drought for potentially the past 100 years or more! Past scarcity is also supported by the Phalyak elder who said that

there have been many problems getting water to the fields for 50 to 60 years now. Another asserted that during a historical drought, only 1 in 12 fields could be irrigated—even worse than the shortage experienced recently in 2005-06 when only 3 out of 10 fields were irrigated

Regardless whether some situated scarcity in the past, 70% of respondents maintained that water available for irrigation is declining. The recent abandonment (up to 8 years prior to 2007) of Dhakarjhong's irrigated land-holdings in the walled Tarche (see Figure 2.2) fields located opposite the village, uphill from Phalyak is evidence for this. This reduction of irrigated land is a clear and fresh indication for some of past irrigation water abundance. One villager noted that there even used to be water left over after irrigating *both* Dhakarjhong and Tarche, a reality that seems very far away from the conditions of the present. One respondent felt simply that in the past, there was generally no shortage to speak of at all compared to the present.

18% of respondents feel that irrigation water is just as available now as it was in the past. Then what accounts for the recent abandonment of Tarche? Tsering Choemphel (62) who came to Dhakarjhong 40 years prior said that water is just as scarce as when he first arrived. He stated:

Even when watering Tarche there was scarcity. People had to do nighttime irrigation, called tsenchu²⁸. Tarche could be irrigated today, but too many people are living in the U.S., so there is too much of a burden for people living here to maintain it. People are lazy now also.

Thus, the recognition that what makes water the *element a resource* is manpower (not to mention motivation). There is awareness in the villages that water abundance depends on nature, but irrigation depends on people. This brings to light the problem of *labor scarcity* as a phenomenon affecting the agriculture and irrigation in the Lumbuk area, thus challenging the assumption that water scarcity is either the main or only problem being experienced in the area. Indeed, irrigation would not be feasible without manpower. One of the ways in which this drain of labor has been compensated for is by the influx of seasonal migrant workers from the Hill and Terai regions of lowland Nepal, as well as from migrants Dolpo and Upper

²⁸ Nighttime irrigation is practiced when there is not enough water to fill up the *tsingu* and complete the normal daily irrigation rotation schedule.

Mustang. Traditionally, before the Chinese closed the border with Tibet following the 1950 invasion, Tibetan herders would come to Mustang and other Trans-Himalayan irrigated oases as laborers during the harvest. Today, *rongba*, Dolpi and Loba laborers fill this critical labor demand for in Lumbuk Canyon as well as other places in Mustang. As we will see, this is also an issue in the Colca Valley, which brings to light the common experience of labor shortage accompanying changing irrigation water. I discovered that these two ‘resources’ are sometimes considered one in the same when discussing water scarcity. In other words, water scarcity is seen as the result of labor scarcity, *and vice versa*. This is discussed further in section 5.2, Chapters 6 and 7.

Drinking Water Past and Present

Irrigation water is of prime importance to Dhakarjhong, Phalyak and Pakling, because it is the basis of their primary livelihood activity: agriculture. However, at the risk of sounding esoteric or metaphysical, the spring-fed drinking water seems to *only partially exist* in the imagination of Lumbuk peoples. This is because special drinking water infrastructure with pipes that draw water from area springs were not developed until the early 90’s. And since the stream water from the *lungba* is also very pure, even after it has run through the main irrigation channel all the way to the center of the village, some people don’t see the need for a separate drinking water system. If the drinking water pipes rupture or become blocked, people simply revert to the old method of collecting water: gathering it in a large metal vessel which is stored indoors for domestic needs. Many people noted that they even prefer the *yura* (irrigation channel) water compared to the tap water. One reason mentioned is that it tasted better. This may be due to the fact that the springs in the area seem to have high amounts of dissolved minerals evidenced in the travertine stone formations in the area and calcium deposits in the pipes (the main reason for blockages). The noticeable advantage to the new system at least is that it is more convenient than water hauling.

The important point to note is that perceptions of water changes are dependent on infrastructure function as much as actual water availability in this case. This is also becoming the case in terms of using cement as a material in *yura* construction. Since Dhakarjhong’s drinking water system was not functioning during fieldwork, respondents there agreed that there was a drinking water shortage. However, despite this, they seemed to not be very worried about it since they could drink the pure water out of the *yura*. The village,

furthermore, had already solicited funding from the local VDC (Village Development Committee) for a new drinking water system which they began to construct, during my stay. Phalyak and Pakling villagers had little to complain about their drinking systems, and rather praised the CARE Nepal development project in 1992 which installed them. One Phalyak villager had noticed a slight decrease in the amount of tap water since installation, but nothing significant. Only one Pakling man felt that there was less water, but blamed it on the fact that Yuli village, a small hamlet pertaining to Pakling on a high bank above the Kali Gandaki River, leaves their tap running continuously, thus wasting the water.

The above observations provide at best an uncertain picture of the direction and intensity of changes being experienced in Lumbuk Canyon, even though in some instances a large majority of respondents agree that a particular change has occurred (ex. the decrease in streamflow of the *lungba*). Generally, it seems common for one person to say that they noticed changes and for their neighbor to refute the assertion. This just proves that delimiting changes through perceptions alone is not without its flaws. But of greater interest to this thesis lies not just in the perception of the *how* change is occurring, but in what *meaning* it has for the inhabitants of Lumbuk Canyon.

5.2 The Discourses of Change

In the villages of Lumuk Canyon, environmental change and catastrophic events are often attributed to supernatural causes. The realm of myth, ritual, and the mutual obligations of people in relation to nature are part of everyday discourse. This story is one of many elaborate tales that the villagers of the Lumbuk Canyon area tell, both to pass time and to remember extraordinary events. I encountered it while interviewing individuals in their homes, but at first Rinzin, one of my interpreters did not bother to translate it for me. Only somewhat aware of my interests, he disregarded it as “not interesting” or “just an old story”. Upon insistence I finally convinced him to tell me the plot, and it became clear that this wasn’t just a piece of local piffle. There was a direct connection between asking the villagers about the reasons for changes in Lumbuk’s water resources and their recounting of the story. I didn’t anticipate that my simple questions about water would trigger the villagers’ more colorful storytelling. This is a fact I learned with time was not such an uncommon occurrence in the Lumbuk area.

‘The Curse of the Arya Lama’ as told by Pema Gyurme (55), Dhakarjhong, Mustang, 5 May 2007, translated by Rinzin Namgyal, edited by the author

Once long ago in Phalyak village there lived a very powerful soothsaying lama called Arya Lama, originally from Tukche village²⁹. He was a very important lama for Phalyak because he was the only one who could perform rituals in honor of the village’s folha (father god) and molha (mother goddess) in the proper way. For his payment in return for shyapten³⁰ he demanded the villagers give him grain. He always carried a long golden scepter with him, and would cover it with oil so that when the villagers brought him his due, dust from bad quality grain would stick to it. This is how he made sure he was given only the best grain they had to offer. But the lama didn’t charge a modest fee. He made the villagers bring as much grain as was necessary to cover his golden scepter in a giant pile. One can easily imagine how much this added up to!

The villagers soon became tired of paying so much for shyapten—they couldn’t afford such a high tax! So one day they gathered in secret and decided that the only way to rid themselves of the burdensome lama and his unreasonable price was to poison him.

But, without the villagers’ knowledge, the clairvoyant lama foresaw their plot to assassinate him. When the moment came for them to make their move, the lama suddenly said, “I know of your plan! I have done so many shyapten for the welfare of this village—for the fertility of the land and abundant water... If you are so unhappy with these blessings, I’ll give you two choices: you can go ahead and kill me, or let me say just one prayer and then I’ll leave Phalyak forever and trouble you no more.”

The villagers considered their options, and being a peaceful people preferred to let him pray and leave. “What harm is there in a prayer?” they reasoned. So they chose the second option, and the lama ‘prayed’: “Chumo thamchoe mye la thoen! Nhak-tsal thamchoe toela kye!” (All water sink far below! All forest grow high up on the mountain!).

This wasn’t a prayer at all though. When the villagers heard his words they realized it was a curse! The lama left the village swiftly and as promised never returned. This is why today there are no trees in Phalyak and its springs have eventually dried up...



²⁹ A Thakali village south of the Lumbuk/Baragaon area (see Lumbuk detail map, Figure 2.2)

³⁰ (Tib.) Ritual prayer ceremony led by a Tibetan Buddhist monk

The narrative is etiological in nature, while at the same time a lamentation of the desiccation of one of Phalyak’s precious life-giving *chimi*³¹. Irrigation water in the villages of the Lumbuk area is of vital essence, so the loss of any water is potentially disastrous. The edge of irrigated land is a stark boundary: on the dry side of the *yura*³² it is defined by the near lifeless montane *shukpa*³³ woodlands and thorny scrublands, and on the irrigated side is covered with succulent green *neh* and *chiyak*³⁴ terraces bordered by *changma* and *chuli*³⁵ trees. Where water flows, there is life, and this is a fact ingrained in the Lumbuk villagers’ consciousness and practice. Yet the villagers’ understandings and explanations of their place and its environmental dynamics are myriad. In other words, from villager to villager there is broad variation, but an underlying regularity of thought and perception. The ‘Curse of the Arya Lama’ is just one facet—one perception—in a greater tapestry of the environmental history of the Lumbuk area that unfolded while I searched for locals’ experiences and cognizance of present global changes affecting their water resources.

5.2.1 Reasons for Change

The Curse itself fits under the general category I label ‘supernatural causes’. This type of response is one of seven salient groups I identified in the array of reasons attributed to observed cryo-hydrological changes in Lumbuk Canyon (see Table 5.1). The reasons, as well as the past and future solutions villagers expressed (see Table 5.2) helped to tap into the logic behind their responses, and so the meaning changes have. These responses, although by no

Table 5.1 Categories of the reasons for cryo-hydrological change. Seven salient categories of discursive positions underlie the perceptions conveyed to me by the Lumbuk villagers regarding the reasons for changes observed. Many informants gave multiple responses, so although N = 30, the total number of responses is 51. The percentage in red represents the highest percentage of responses.

	Reasons for Changes							Total Individual Responses
	Does Not Know	Natural Fluctuations	Climatic Changes	Supernatural Causes	Water Sharing	Ecological Changes & Disturbances	Air Pollution & Global Warming	
Group Total	6	6	11	17	3	5	3	51
%	12 %	12 %	21 %	33 %	6 %	10 %	6 %	100 %

³¹ (Tib.) spring

³² (Tib.) irrigation canal

³³ (Tib.) juniper (*Juniperus spp.*)

³⁴ (Tib.) two varieties of cultivated barley (*Hordeum spp.*)

means an exhaustive summary of *every* local explanation for environmental changes, nonetheless give a rich cross-section of Southern Lobas' overall perspectives. Part of the richness is in the complexity of responses that comes to light. Villagers did not always express a single root cause for observed changes, nor a single solution. Rather, they frequently cited multiple reasons and solutions, illustrating, if not an ambivalence, at least a plurality of discourse. This explains how foundational legends and miracle narratives may appear side by side with more experiential or empirical observations of the ecosystem, or even modern scientific explanations. For complete tables of individuals' multiple responses in the Lumbuk area, see Appendix A.

As Figure 5.1 shows, the categories of the reasons for change include *air pollution and global warming, ecological changes and disturbances, water sharing, supernatural causes, climatic changes, natural fluctuations*, and finally *does not know*. The way in which the categories are argued reveals the reasoning used and can allow us to elucidate the factor(s) influencing it. Generally, the influencing factors can be seen as either 'internal' or 'external' to Southern Loba society, referring to either local or outside explanations for change.

Air pollution and global warming represents an external, modern western scientific explanation for the changes observed. Although I did not encounter this explanation with great frequency, it nonetheless shows that 'modern' discourses of changes are arriving to even the remotest of Himalayan villages. Two of these respondents were relatively young (21 and 27 years old), and cited air-polluting vehicles as the causes for increasing temperatures. The 21-year-old from Pakling mentioned global warming explicitly. I interviewed him together with his father (42), who preferred a supernatural explanation to elucidate why the water sources (springs, stream) had changed, stating that it was due to *kalatooah* (the "bad or end times"; see below) and probably the fact that long ago villagers stopped sacrificing animals for rain, thus neglecting the gods. The sacrificing of animals as mentioned in Chapter 2 is a practice from the indigenous Bon religion of Tibet and the upper Kali Gandaki, which was outlawed by Buddhism and the doctrine of *ahimsa* or non-violence. Since I encountered this doubt among respondents quite frequently, they may still be insecure about the coherence of the Buddhist meaning system and practices for communicating with and appeasing the gods. Whether the 21-year-old son's 'modern' or the 42-year-old father's 'traditional' discourses

³⁵ (Tib.) willow (*Salix spp.*), used for animal fodder; and apricot (*Prunus spp.*), respectively

are used here, it is important to note that neither respondent protested the other's explanation. This is one of multiple instances where parallel reasons were attributed to cryo-hydrological change.

Supernatural causes were the most-frequently cited of reasons for observed climatic and cryo-hydrological changes, and are internal explanations for change because they are based on the logic of the Southern Lobas' cosmology. 33% of all responses cited different supernatural reasons for why everything from weather to the attitudes of people had changed relative to the past. Lack of prayer, offending the gods by cutting down *shukpa* trees, polluting *chimis* or springs with trash, clothing detergent or animal feces among others were attributed causes. One of the most common supernatural reasons mentioned was *lha mengyeta*, or the 'loss of God', resulting from *kalatooah*, or the 'bad age'³⁶. One informant explained that this 'loss' ensued as people became increasingly unruly, anti-social, and self-serving in their behavior and attitude toward each other and their resources. The greediness of the villagers over sharing water and other resources resulted in a loss of God, and therefore, the proper punishment: less reliable snowfall and rainfall, meaning less water for irrigation. This view was expressed commonly throughout my field conversations, showing indigenous reasoning about the dialectical relationship people have with their divinities, mediated through their behavior toward each other and their interaction with the natural world. People view the environment as inherently delicate, because if they disturb resources too much, the gods and spirits associated with these natural features will become angry, upsetting the cosmic balance. Quarrelling with each other also gives this result. When a spring starts drying up or if the snows do not come, then the people fault themselves for breaching cosmic rules and norms. This guilt thus prescribes prayer and pilgrimage to assuage the outrage of the gods and spirits of the world. Since the environment is always in flux, there is thus always a need for prayer and ritual to return the world to a balance.

³⁶ *Lha mengyeta* brought on by the phenomenon of *kalatooah* or the 'bad age' was explained to me by several villagers. *Kalatooah* (also referred to as *kala-guti-lokti* and *kala-tuktu*), in turn, is a sort of end-of-days period where the order and sanctity of the world is overcome by accelerating disorder and maladies in general. Such ills are evident in everything from people's behavior to unusual climatic fluctuations, as illustrated above. One informant explained that he had read about this in a Tibetan book called "Doma-che"; all villagers seemed to be familiar with the concept though. *Kalatooah* and its other forms alone were cited frequently as the reasons for the changes. As one Dhakarjhong resident said of its effects, "...everything is getting less! Irrigation water, snow, rain... *Neh* (barley) doesn't grow as high as it did before... even *people* are getting shorter now!"

Ecological changes and disturbances were also reasoned as causal agents for changes, and appeared in two forms. The first argues that ecological-hydrological disturbance, such as the cutting of *changma* or willow (*Salix spp.*) trees lining the irrigation canals was having broader impacts on local water levels. However the second argument says the cutting of *shukpa* or sacred juniper trees (*Juniperus spp.*) against a *lama's* recommendation was, in addition to an ecological disturbance, seen as an offense to the *lhu* or serpent gods associated with the trees and springs. The ecological-hydrological explanations were given by a 23 and 27-year-old, while the supernatural case was made by a 51-year-old man. I also encountered the latter explanation from other individuals during field conversations, both young and old. This category can be seen as internal, however the ecological-hydrological explanation is potentially a sign of outside influence from the local government agriculture office which gives advice to the villages about cultivation techniques. In addition to the above arguments, one individual from Dhakarjhong also suggested that the changes were due to the fact that two migratory bird species, *cha khopyuk geyu* (a cuckoo) and *chalong* (the Demoiselle crane) who were said to be no longer bringing their respective “gifts” during their through-migration at different times of the year (see Appendix B for more information on this). These ‘gifts’ are rainfall and snowfall, respectively. The positive connotation of ‘gift’ underscores the importance of the precipitation these birds are perceived to ‘bring’. While a reason for changes, this explanation is also another important *emic* index providing a window into local indigenous knowledge about environmental cycles and changes.

Climatic changes, the second most frequent group of responses, seem to ‘beg the question’, naming the cause *as the cause*. This logic is circular, but some respondents merely intended to elucidate the causal relation between changing climatic systems and temperature, and the associated effects on the local hydrological regime. However, it also hints at a reluctance to answer the question altogether. Many emigrants living in the villages, like sharecroppers from Upper Mustang and the neighboring region, Dolpo, gave this response. As outsiders, they explained that they could not propose solutions for any village problem, so in turn seemed hesitant to discuss causes because they were obligated to follow the status quo of the original landowners of the villages. Thus the lower social ranking of outsiders restricts their participation in discussions of import to village affairs, as is shown here.

Natural fluctuations is an interesting category of responses, in which respondents asserted that any change observed was just part of the normal cycle of local climatic fluctuations.

Respondents stated flatly that yearly variability is the rule of nature in their corner of Mustang. “It’s always like this,” several informants pointed out, adding that “snow and rain always fluctuate”. Although a frustratingly simple response, these informants conveyed a deeper message about the inherent struggle involved with living at the whim of Nature and her sometimes wild fluctuations in the Lumbuk area. It also reflects their resilience as farmers in an extreme environment. A ‘tough’ attitude in this regard is requisite in approaching the area’s many environmental challenges. Of the six respondents to name this category, three of them also cited supernatural explanations for the cause of changes. This is illuminating because ritual and religion seem to be rational responses to the fluctuations of the natural world that test human perseverance.

The *does not know* category at first seemed just like a reluctance on the part of the respondent to answer, however I learned that people gave this response when they felt that my question was simply too big for them to know the answer. As one respondent exclaimed sarcastically, “I’m not a *lama!* I don’t know why there’s less [precipitation]!” This response made clear that the problem of changes in nature is far beyond the control of people. Another Dhakarjhong also stated, similarly, that it’s “not possible to know about nature”, as if imploring me to ask myself why on earth *he* should have the answer to such a question. Together with this category, respondents also argued for supernatural causes, natural fluctuations, water sharing and changes in precipitation and temperature, showing the plural rationality for this category.

Water sharing is the final root cause of changes observed presented in Lumbuk Canyon. One way of arguing this position was by faulting the conflicts between villages for scarcity, because fighting could easily anger the local gods who could punish people for being quarrelsome. The sharing of *lungba* water has historically been a problem especially between Dhakarjhong and Phalyak. I encountered the sentiment that all of the problems arising from sharing would disappear if the other village across the canyon would just disappear, as one Phalyaki mentioned, although jokingly. A similar perspective asserts that the same amount of water exists now as in the past, but previously, Dhakarjhong didn’t share its irrigation water supply with Phalyak, which it does now. This perception takes an interesting discursive position because it is the basis for an addendum to the Arya Lama legend that Dhakarjhongis tell. They vehemently claim that they were once the sole users of the *lungba*’s water before Phalyak wrestled more than half of it away from them. But how do the Dhakarjhongis

substantiate this claim? For the answer, I again turn attention to the realm of legend, where we left off at the end of the story of the Curse of the Arya Lama.

5.2.2 The Thakali Tricksters:

Epilogue to the Curse of the Arya Lama, as told by Pema Gyurme (55), Dhakarjhong, Mustang, 5 May 2007, translated by Rinzin Namgyal, edited by the author.

Over the years since the Arya Lama left Phalyak, the three springs and a small lake fed by them started drying up. Once overflowing with water, the springs were now only trickles. Phalyak, increasingly desperate for water, started looking elsewhere for more. Naturally, they looked to the lungba, which ran plentifully with mountain meltwater. However, Dhakarjhong held exclusive rights to this stream which divides the villages in two.

Dhakarjhong held rights to two yuras³⁷, one on either side of the lungba. One fed fields on the Dhakarjhong side of the canyon, while the other watered Dhakarjhongi fields situated within Phalyak's farmland. Phalyak, drying and thirsty, pleaded with Dhakarjhong to allow them access to a small portion of irrigation water. Finally, the Dhakarjhongis felt pity for their neighbors and agreed to help them. This is how Phalyak started to use the lungba water.

But over time, irrigation water became so scarce that Phalyak was in need of more. At this time, two Thakali men originally from Marpha village named Shankarman Subbha and Thak Prasad Subbha lived in Phalyak. They had good knowledge of the laws of lalpurja³⁸ and knew that if they made a claim for half of the water from the lungba with a written deed, they would be supported by the laws of the water court in Jomsom. So they summoned the villagers of Phalyak to a secret meeting to propose their plan, which the villagers agreed to and accepted.

When Phalyak village took their written claim to the water court for 50% of the water in the lungba, Dhakarjhong could not defend their right to it because they had no written deed to prove it—matters of this type were always recorded orally in their tradition! Thus the two Thakali men cunningly stole half of the water that rightfully belonged to Dhakarjhong. But the story didn't end there...

Later on, the Phalyak villagers, again led by the Thakalis, met in secret to get even more of Dhakarjhong's water! They planned to give a final ultimatum to Dhakarjhong: cede all Dhakarjhong land holdings within Phalyak land below

³⁷ (Tib.) Irrigation canals

³⁸ (Nepali) a testimonial document with red seal for land ownership (Source: Gautam's Concise Nepali-English Dictionary); I understood this to refer to a 'deed' during fieldwork.

the road to Dolpo, or give Phalyak three days rotating rights of water and Dhakarjhong only two.

Conflict was sparked and Dhakarjhong defended their lands on the other side of the canyon over the water, especially their prized walled field called 'Pishing' where they grew the best grain in those years. In the end, Dhakarjhong, unable to bargain with Phalyak's cunning Thakali leaders, chose to defend their land holdings in Phalyak, reasoning that "water will never run out, but without land, we have no life!" So, in the end Phalyak gained rights to three days' rotation of lungba water, and Dhakarjhong was left with only two, and it is still this way today.



Interestingly, this story was told *only* by Dhakarjhong residents as an addendum to the legend of the Arya Lamas. It is important to the villagers because it memorializes a historical turning point for them from an idyllic, prosperous past to a present characterized by privation, competition, and struggle. The story conveys a longing for the days when Dhakarjhong was the sole user of *lungba* water, a thought that would excite any of the farmers, because more water inherently means more cultivation, and thus a better life. But that is no longer the case, and instead the Dhakarjhongis fell victim to the Subbha 'tricksters' of Phalyak and lost over half of their original share of irrigation water.

Of note in this narrative is the pattern of interaction it establishes between the characters involved. Both in the legend of the Arya Lama and here in the Epilogue, a clever outsider takes advantage of an innocent group of villagers—the insiders—resulting in great misfortune. The calamity in the Arya Lama story is that the *lama* punishes the Phalyakis after they discover their good sense and grant him amnesty rather than killing him. In the climax of the Epilogue, Dhakarjhongis defend their land holdings in Phalyak instead of their water rights, which today they realize was in error because water has turned out to be more precious than land. But despite the fact that Dhakarjhongis are bitter about the loss of their water rights, they nonetheless accept it "because it was decided by their forefathers". The story recapitulates local history, lamenting (but interestingly not protesting) the events of the past to which villagers attribute the present limitations of Dhakarjhong.

These narratives create a pattern, or set a precedent of social interactions in which the actors involved are assigned explicit roles, always acted out in the same way: innocent or naïve villagers fall victim to cunning antagonists. But the protagonists—the villagers—do not triumph. Rather, they concede defeat and adapt to their new condition. This pattern has every mark of the fatalistic ‘way of life’, Thompson would probably agree, and the stories only serve to entrench an unfortunate mistake of the past—a local tragedy. But these narratives, again, are only part of a wider discourse about society and survival in these small, dry trans-Himalayan villages. Some villagers believe that their lot is not to passively play the victim, but rather to usher in new technologies, like pipes and cement for irrigation, and revive an old monumental canal from Syang in a neighboring micro watershed. These myriad solutions will be discussed here following.

5.2.3 Responses to Change

The following responses to change were elicited by questions about available and future solutions to drought. These responses indicate the meanings that villagers assign to changes in local water resources. They also give insight into ‘internal’ and ‘external’ means for coping with environmental changes. These influences can be discussed in terms of cultural attitudes, as well as changing dialectics in Lumbuk Canyon. Figure 5.2 summarizes the proportion of different responses given in Lumbuk Canyon, which include *prayers*, *no solution*, *migration*, *adaptation*, *collective action*, *aid*, *agricultural intensification*, *technical solutions and innovation*, and *banning pollution*.

Figure 5.2 Categories of the available and future solutions for negative cryo-hydrological changes. Eight and seven salient categories were recognizable in the available solutions and future solutions for water scarcity, respectively. Again, the percentage in red represents the highest number in each group for a particular discursive position. The two highest are marked red for the future solutions given.

		Solutions for Change									Total
		Prayers & Ritual	No Solution	Migration	Adapt	Collective Action	Aid	Agricultural Intensification	Technical Solutions & Innovation	Ban Pollution	
Available Solutions	Group Total	21	9	--	1	8	5	1	10	1	56
	%	37 %	16 %	--	2 %	14 %	9 %	2 %	18 %	2 %	100 %
Future Solutions	Group Total	7	8	11	7	1	4	--	10	--	48
	%	14.5%	17 %	23 %	14.5%	2 %	8 %	--	21 %	--	100 %

Villagers were asked to imagine what actions could quell the effects of drought, both external and internal solutions arose. The most frequently cited available solution was prayer, with 37% of total responses. This corresponds to the large percentage of supernatural causes attributed to the observed changes and reflects a major dependence in the Lumbuk Canyon area on religion and ritual to cope with problems of water supply. Being relatively isolated, it perhaps comes as no surprise that Lumbuk villagers still rely on local explanations and methods such as prayer to cope with changes that are occurring. From a ‘modern’ scientific or development perspective, attributing change to angry gods appears naïve and simplistic—not grasping the *reality* of the situation. But *lha mengyeta*, *kalatooah*, local deities and spirits have clear meaning for the villagers. They all fit into a logical framework that makes sense to them culturally. So, is it reasonable to categorize these individuals as *fatalists* in Thompson’s scheme and neglect to understand how supernatural causes of change make reasonable sense in the local context? As I observed, prayer and rituals are not merely passive means of reacting to nature. They actually accompany local action, like the communal cleaning of the irrigation canal and *tsingu* or pond in the spring. It seems a way of *driving* action. The Southern Lobas have to negotiate and balance their common needs of the environment, without overstepping the delicate limit of overuse and abuse. The sanctification and ritualization of the appropriation of water and other resources is a means of assuring that all participate in attaining what each needs to survive. Without *shyapten* and other common rituals like pilgrimage to the local Lumbuk shrine or offering of *torma*³⁹ to the *lhu* and *lha*, the balance would be tipped too far and the gods would not give what the people need. Rituals are the spiritual tender or communal ‘payment’ that the villages are able to offer the gods for a secure life: plentiful water, good harvests, etc. If nature is out of balance, then the cause is seen as the lack of prayer. Likewise, being lazy with prayers always has the potential for an environmental consequence, thus the need for the repetition of ritual. This kind of transaction metaphor pervades the religious logic of the villagers of Lumbuk Canyon.

However, prayers and ritual are relied upon less when respondents reflected about how to respond to a future drought. Instead, people turned to migration and technical means of coping with water scarcity. These categories reflect a much more ‘modern’ reasoning for dealing with environmental adversities. In Thompson’s terminology, we could also view the

³⁹ (Tibetan) an offering cake made by *lamas*

immigrant as a fatalist, but the ‘technologist’ as an individualist. However, again some respondents defy the logic of the typology of cultures by their plural rationality, as for instance one middle aged Dhakarjhongi man who saw both solutions as viable responses to water scarcity. He, also in addition to prayer, mentioned building a canal from Syang watershed to solve water demand in scarce times, but if water were to someday run out, then “everyone should shift to the U.S.!” Although migration is historically part of the yearly cycle of trans-Himalayan life, when people would leave the snowy highlands in winter to trade on the Gangetic Plain, in the present case it also reflects the increasing dependence on the external market economy to secure livelihoods. My respondent-friend, Dhotak, who was visiting Dhakarjhong from his adopted home in Brooklyn, New York commonly spoke of how ‘poor’ his village was and how opportunity laid only in the labor economy in his *new* country. He also achieved higher merit locally as a wealthy benefactor because he was able to donate large sums of money to the village *gomba* or monastery and to the Lumbuk shrine for their maintenance and improvement. Even some individuals who stated that they would never migrate away from their village and leave the life of farming had sent all of their children for schooling in Pokhara, Kathmandu or India so that they could have ‘better’ lives.

Some individuals were content to respond to environmental adversities through the use of modern technologies such as plastic pipes and cement. Such construction materials have been made readily available through NGO’s such as CARE Nepal (in the early 1990’s), as well as local government agencies, such as the VDC, and also through funds allocated through the village Conservation Area Management Committee (CAMC) of the Annapurna Conservation Project Area (ACAP). These organizations have created inroads locally for reliance on modern technology in agricultural and irrigation practices. People adopt these new materials openly in practice, since they are considered superior to locally available construction materials. Although pipes and cement have their benefit though, many respondents voiced complaints about their poor quality and rapid deterioration. They are dependent, thus, on constantly obtaining new materials for repairs and replacements. This solution can be said to fulfill the criteria for the *hierarchist’s* ‘myth of nature’ since “the problem is... soluble with the help of established institutions and their certified experts” (Thompson et al., 2007: 33). This category is closely related to the *aid* category furthermore. The respondents who cited this solution just referenced the petitioning of aid from agencies and organizations for development, without detailing specifically how the funding could be used.

In addition to solely materials, another important response within the technical solutions category is the proposed building of the Syang Canal. Ongjuk Gurung from Dhakarjhong first told me about this ancient canal, which seemed just as mythical as the story of the Arya Lama. In fact numerous villagers have heard of the old canal, which would have diverted water over a 4000+ meter-high pass from the Syang River watershed immediately south of the Lumbuk watershed to Dhakarjhong. In those times, he explained, the villagers irrigated an area much larger than they do now (evidenced by the abandoned and eroding terraces covering the area outlying the present extent of irrigated fields). This is evidence of the hard-working spirit of the ancestors of Lumbuk Canyon—a spirit, they say, that is becoming ever scarcer, just like water. The Syang Canal, thus brings promise and hope not just for drying fields but also for the people and their withering attitudes. And for Dhakarjhong in particular, people see the canal as a historic right, which greatly benefited people in the past, and which is capable of securing their future. But, as another respondent said, “if only they had enough money to construct it or an outside donor to fund it, then of course they would build it! But Syang does not want to give them any of their water...” Nonetheless, with the technological means and agency funding available today, the canal seems relatively in reach for the villages. It is a scheme that fits within the growing development narrative that people argue for in the villages. The ‘resurrection’ of this old canal would help reclaim old abandoned lands, but without a doubt it would spark new tensions not only between Dhakarjhong and Syang, but between the former and Phalyak especially since the two have a history for quarrelling over their water. This is at once an internal *and* external solution for water scarcity.

Collective action and adaptation are locally available methods of dealing with environmental changes where people depend on their agency and cooperation for overcoming ‘lean’ times. Adaptation in this context refers to an accommodation of environmental change by, among other things, “tightening the belt”, as one Phalyaki expressed. Furthermore, another respondent showed the ‘adaptive attitude’, stating that the villagers would simply have to irrigate less frequently in a future drought and wait for a year with more water. Another added that as long as the shortage is moderate “there is hope”, taken in the context to mean that they will be able to shoulder the stress as long as they have the chance to recover. Another repeated the first, saying they should farm less land, and leave *tarko*, or that they should just plant less water-consuming crops, namely maize. In reference to spring water, one respondent said that if it dries in the future, the people will just drink out of the *yura*. More skeptical about any drying up at all, a Pakling resident stated that the spring will just

shift down the canyon as had been observed, “so they will just follow it down”. The sentiment that water will never completely disappear seemed not just an attitude, but a faith for some, as one Dhakarjhongi stated: “water will *never* run out!”.

Collective action, similar to adaptation, relies on communal labor groups called upon by the village *kemba*. These groups, called *lengyi* and *mepta* are the traditional method of organizing group labor for the benefit of the entire village. This system is still honored by the villagers, and is one of the most effective means of achieving large projects, such as the construction of a village water tank, which I witnessed and participated in during fieldwork in Dhakarjhong.

Agricultural intensification is interesting in that it approaches the notion of scarcity not in terms of water, but of labor. One Dhakarjhongi stated that “people should shoulder their burden and avoid leaving *tarko*,” implying that the amount a farmer is able to grow is a function of the labor he or she invests in the farming process, rather than amount of water available. In regards to labor, and thus the wider labor force in Mustang, there are two interesting perceptions appropriate for mention here: on the one hand some say that people’s laziness (because of *kalatooah*) limits the amount that one can cultivate, while on the other hand others say that outmigration, and thus a reduced labor force is what is draining agricultural production. Outmigration is another sort of ‘melt-down,’ so to speak, in Mustang where members of the younger generations are flooding out of the monetarily poor, isolated district to Pokhara, Kathmandu and a number of places abroad to earn money working. This category, thus, forces us to look at the human effects of changes in the water resources of Lumbuk in broader terms. When we consider labor in the balance of various causes, then a more complex picture of this land-based society comes to light.

Banning pollution is a clear influence from the global warming debate, and as is evident from the number of responses, it is still a minority response that does not make very much sense in the cultural frame of Lumbuk Canyon. And finally, *no solution* is a definite fatalist response, which again was commonly given by sharecroppers who were excluded from village decision making process. Some of these responses also tied into the supernatural and natural fluctuation reasons for the observed changes, again conveying the attitude that “it is not possible to know about Nature”, as one respondent expressed.

5.3 Summary

From the attitudes expressed about the reasons and solutions for the cryo-hydrological changes described in Lumbuk Canyon, we obtain a profile of the varying discursive positions that the Southern Lobas utilize. From these perceptions, we can infer the societal and cultural influences in their cognizance of water and the changes which effect it. From the mythological to the empirical, people use a variety of internal and external explanations for how and why their cryo-hydrology is changing.

The next chapter presents the perceptions of the Colca Valley residents facing similar cryo-hydrologic changes from a distinctly different cultural perspective.



Photo 7 Lama performing *shyapten* in the *tsingu* on the day of community cleaning



Photo 8 A cross in the Colca Canyon below Tapay

Chapter 6: Colqueño Perceptions

Field Notes, January 19, 2008:

I crossed the plaza of Cabanaconde on my way to the municipality, past the quirky fountain at the focal point of the hedge-bordered square. It had a cartoonish sculpture of a stylized volcano-with-condor-sitting-on-top—the tourist icons of the Colca Canyon. It didn't match the Spanish colonial-period church on the other end of the plaza. The wind picked up, and above, the clouds were swirling and getting darker...

While I awaited my turn to meet with the gobernador⁴⁰ of the district of Cabanaconde, I spoke with the 30-something, thin and clean-cut Pedro González, the district registrador⁴¹. We sat in his modest office on the second floor of the municipal building, which was constructed out of more 'modern' material noble⁴², and stood out against the traditional adobe⁴³ buildings in the rest of the village. I asked him about water in Cabanaconde and environmental changes affecting the village's agriculture and irrigation. He was happy to answer, and we both took turns choosing the topics. Also in the room was an older man who looked like another village official, and the secretary, a woman, who sifted through the over-sized birth registry archive. They sidelined the conversation, mildly curious about what the gringo⁴⁴ had to say to the registrador.

Pedro explained the importance of the 'technification' of Cabanaconde's irrigation canals, the problem of recent uncharacteristically heavy rains and the troubling situation of Hualca Hualca Volcano's melting snowpack. He told me about Cabanaconde's antepasados or ancestors⁴⁵, praising their singular dedication to agriculture, evidenced in the abandoned terraces etched high on every hillside around the village. He also detailed for me the irrigation cycle and added reflectively that water was a 'primordial', vital liquid for Cabaneños.

Then Guillermo Cayani, the gobernador, was free to talk. I went to his office noticing that the wind had picked up outside and rain started falling. We hadn't talked for more than three minutes before thunder clapped violently on a nearby hilltop and the sky opened up. Everyone in the municipal building

⁴⁰ (Spanish) literally governor; the top official of a Peruvian district

⁴¹ (Sp.) literally 'recorder'; the clerk of the district who is responsible for collecting and filing vital documents, such as birth, marriage and death certificates

⁴² (Sp.) literally 'noble material'; connoting 'modern', 'higher quality' construction and building materials such as fired bricks, cement, rebar, corrugated metal for roofing, etc.

⁴³ (Sp., from Arabic *al-tūb*) A sun-baked mud brick

⁴⁴ (Sp., Mexico, slang) *South America*: any white non-Hispanophone; *Mexico*: derogatory slang for a white-skinned Anglophone from the United States

⁴⁵ When Cabaneños or Tapeños spoke of their *antepasados*, they were referring specifically to the pre-Hispanic residents of the area.

gathered at the windows simultaneously, with the same awestruck fixation on the downpour which became more and more intense. We looked at each other in disbelief as the streets in the plaza became swift, muddy streams. A young woman outside tried prying a blockage loose from the overflowing storm culvert on the street in front of the condor-topped volcano fountain I passed half an hour before. I heard the old man say that he had never seen rain like this in his entire life. The woman said God must be punishing Cabanaconde...

The next morning, rumor spread that it hadn't rained that hard in Cabanaconde for over 70 years...

-Cabanaconde, Colca Valley, Perú



When I visited the Colca Valley, environmental and climatic changes were a topic that resonated with everyone with whom I spoke. The aberrant rains gave good reason for this and opened village-wide discourse of the topic. With the aid of modern communications though, soon the entire region was aware of the January 18th deluge. But this was just one instance of a wider weather phenomenon in southern Perú which locals, in addition to their 'home grown' explanations, were starting to blame on *La Niña*. Individuals' perceptions of the changes from Cabanaconde and Tapay villages give further insight into why and how not only the rains but more diverse environmental changes are occurring and affecting the water resources of these mountain agro-pastoral communities.

6.1 How is Change Occurring?

6.1.1 Eco-Climatic Change

Precipitation Change

Rain was the biggest subject of climatic debate when I went to the Colca Valley. Villagers were very aware of the aberrancy of the present rains, above illustrated. Although some stated that it had not rained like this for more than 70 years, Luis Salinas Huaranca (40) from Cabanaconde said that it used to rain this hard in his childhood. Some mentioned that in general there is less rain and others noted that the rainfall pattern is altered and more erratic now. I was told that the rainy season used to arrive like clockwork before, starting always

around the 15th of December and lasting until Easter. A few offered that the rains actually used to begin in November and last until May, meaning six months of rain! Others noted with disappointment that rains are coming later now. In the present year (2008), the rains began in January, and in 2007 they didn't start until February.

While it is raining at lower altitudes around Cabanaconde at 3,300 m and Tapay at 3,000 m, it is snowing in the highlands above 4,500 m, Don⁴⁶ Paulino Junco told me. Don Paulino (62), is a Cabaneño who has mostly given up on agriculture in favor of running a tourist hostel. I asked him about changes in precipitation, and he said “there are *crazy* changes in rain and snow!” Although he did not mention snowfall, he did notice a dramatic change in the amount of ice present on the slopes of Hualca-Hualca volcano. The volcano's ice cap, he stated, had retreated significantly, before reaching far down the mountain's slopes. This has resulted in a noticeable decrease in the amount of river water in the Río Hualca-Hualca. Although, the irrigators of Cabanaconde have noticed the effects, these changes do not impact them directly since they depend mostly on the water delivered through the Majes project irrigation canal. Later, though, he added that in all precipitation was moderate to normal, implying that change is a part of the weather cycle here. He admits though: “I'm mixed; I lived half my life in Lima and half in Cabanaconde”, pointing out his bias. Other villagers from both villages said that there is less snow and ice on the high mountains. One added that it has decreased over 25 years. The snow is also observed to melt faster in the dry season than before. Before, high mountain snow lasted until the beginning of the rainy season in November-December, but now it lasts only until August, according to one account. Others have cited that lately it lasts until October. Raúl Álvarez (51) a Tapeño man, invoked his *antepasados* or ancestors, using the Quechua term *purmaketke*⁴⁷ to refer to the snow and ice that used to last on the mountains until November. Now, he said, *purmaketke* usually does not remain that long before melting. Using another emic index for mountain snow and ice, Yamil Junco (38), Don Paulino's son, noticed that Hualca-Hualca Volcano no longer had a “belly”. He also added that Bomboya Mountain above Tapay on the other side of the canyon from Cabanaconde had visibly less snow throughout the year than previously. Nonetheless, one man from Cusñirhua near Tapay, repeatedly insisted that the snow of Sepregina Mountain, right next to Bomboya, *never* lasted beyond April-May.

⁴⁶ (Sp., *masculine*) Title of respect given to people with high status such as elders (*fem.*: *doña*)

⁴⁷ (Quechua) permanent high mountain snow and ice (source: Raúl Álvarez, pers. comm., 24 January 2008, Tapay, Perú)

Other skeptics of precipitation change stated that there was simply no deviation at all. They suggested that all fluctuations are normal. The man from Cusñirhua added that in Tapay they are always between abundance and drought. Another villager said that climate is always variable, but conceded that the seasons were “sharper” before.

Vegetation Changes

Since agro-pastoralists also manage animals, they are acutely aware of the vegetation changes brought on by fluctuations in moisture. The local indices of precipitation change are highland pastures and the fruit orchards of the lower valleys. The pastures are particularly important for villagers who have herds of llama and alpaca, and the orchards are the basis for the Colca barter economy of remote canyon settlements like Tapay. Many noted that the pasture grasses do not grow as high any more, a change which they attribute to less and more erratic rainfall. Most villagers that I interviewed made this rainfall-pasture grass correlation. Clodoaldo Regino Oxa (60) from Cabanaconde added that “the mountain has become depopulated” of grazing animals as a result of the decreasing quality of wild grasses. Another informant explained that timely and sufficient rains are needed for grass production to last into June when animals need it most. If natural grasses cannot sustain alpaca and llama herds, then it is uneconomical to raise animals. In Tapay, a few noticed the effects of decreased rainfall on their apple orchards. But as always, there is at least one skeptic to state that “it is the same as before; when it rains, grass grows, and when it doesn’t, the grass dries”. Nonetheless, wider vegetation changes due to changing precipitation patterns have implications for the pasture dependent herders and rainfall dependent orchards of the area.

Temperature Change

Many respondents concurred quite simply that the temperature is increasing. Many emphasized that the daytime heat “burned” now in comparison to the past. However some other respondents specified that days had gotten warmer, but nights had grown colder, interestingly. One even said that it is *much* colder this year, and that the heat during the day is “unbearable”. A Tapeño man noted that the cold in the winter months was more intense. In all, it seems that residents are noticing more extremes in *both* high and low temperatures.

6.1.2 Source Changes: Water as ‘Element’

Stream-level Changes

As with the categories regarding climatic changes, various observations on stream level were mentioned. One group stated that stream discharge had decreased, arguably the result of less snowmelt and ice. One Tapeño noted that the stream dries sooner now—in August instead of November-December. This was supported by others too. A few expressed their optimism in regards to the present abundance of rain, and the increase in the river level. Nonetheless the water available in the river for irrigation had lowered over the years in general.

Some individuals posited that the stream rises and falls because of normal fluctuations. One explained that stream discharge depends on snowfall, which is always in flux from one year to the next. This was supported by others who stated stubbornly that “when it snows, there’s water, and when it doesn’t, there’s not”.

Spring Water Changes

Springs are scattered throughout the landscape in the Colca Valley and are of importance to Cabaneños for their drinking water, and for Tapeños for both drinking and irrigation. Some feel that the spring discharge has lowered, and both desiccation and decreasing ice are blamed for this. As has also been noticed by some in regards to the streamflow, springs have now also started to dry up in August. The reason for this is less rain and snow. One frustrated Tapeño, informed me that one spring dried up, despite the efforts of the villagers who had crafted a cement capture tank below the spring. Another Tapeño shared that the spring shifted downhill, reminiscent of the case of Dhakarjhong. One Cabaneño stated that he had heard that the village’s mountain spring had lowered, even though it originated at the end of a 70-meter-long tunnel under the mountain.

Some argued that there was no change in area-springs’ discharges, and that like precipitation and stream levels, springs are also constantly fluctuating. Another Tapeño stated that the spring was the same as always, but had lowered in recent years during the dry season because it had been diverted for irrigation due to low stream discharge.

6.1.3 Resource Changes: Irrigation and Drinking Water

It is hard to separate the *element* of water as it flows through streams and out of springs from the *resource* that people use for irrigation and basic domestic needs. This underscores the importance of understanding the effects on Cabaneños' and Tapeños' irrigation and drinking water, not just the streams and springs.

Irrigation Water - Present

At the present time, many respondents feel that there is a shortage of irrigation water. One informant from Tapay said that the last 2-3 years have been very dry, which resulted in the village's diversion of the drinking water system to irrigate, as mentioned above. Another Tapeño blamed low water for not being able to cultivate 100% of the surrounding arable land. Also, the village's *reservorios*, or irrigation retention tanks (like the Lumbuk villages' *tsingu*) were no longer filling up, causing difficulties for irrigators. A Cabaneño stated that although there is less irrigation water now, Cabanaconde can manage because the village depends on the Majes Canal for water. But, he added, Cabanaconde should theoretically be able to cultivate the entire *campiña* without the help of the Majes canal; they were *supposed* to use just Hualca Hualca River water originally. It seemed like this thought struck him as puzzling, forcing to ask of himself as many other informants had, "how on earth did the *antepasados* pull it off?"

However, some individuals did not believe that there was any alarming shortage of irrigation water to speak of. Rather, they reasoned that "there is always some degree of shortage". The man from Cusñirhua in Tapay added that water is always short here, in effect, *defined* by shortage. Another Tapeño asserted that *now* there wasn't any shortage, as if begging me to just look at the present rain falling from the sky and understand that it was good. "But of course", she countered her *carpe diem* attitude, "in the dry season we lack water".

Irrigation Water - Past

Many respondents remember the past for its abundance of irrigation water. Some residents of the Colca Valley idealize past agricultural production, in awe of the extent of the ancient terraces covering the hillsides. But many have noticed changes in the extent of irrigation within their lifetimes. Except in Cabanaconde, where the irrigated area exploded with the

opening of the Majes canal, in Tapay the situation has grown bleaker over the past years. Washington Ura (40), the president of the *Comisión de Regantes*⁴⁸ recounted to me the abundance Tapeños enjoyed before:

Before we irrigated all we wanted. The three estanques⁴⁹ even used to overflow! We had to expand the biggest tank because when it would overflow it became a problem. There was so much water we had to irrigate at night. But now the tanks don't even fill up when we seal them shut overnight.

Before, Don Paulino stated, Cabanaconde irrigated circa 1,200 hectares of land, but now there are only 300 hectares cultivated. He added though, that before the villagers worked diligently to irrigate, implying the singular importance it had to their livelihood. Today, he seemed to be saying, people don't depend solely on farming and irrigation. This is at least true for people like himself working in the tourism sector. Another respondent maintained the stance that the climate is always variable, so irrigation is too. The respondent from Cusñirhua repeated that there's always shortage here (in Tapay), "that's why the youth move away". This view posits that outmigration is a function of the supposed endemic resource scarcity of Tapay, and also makes the connection between irrigation and labor. If there is a shortage of either water or people, agriculture will always be limited, and so the livelihood opportunities of the villagers.

Drinking Water Present and Past

The gap in development between Cabanaconde and Tapay is visible in the drinking water systems of the two villages. In Tapay, just as in Lumbuk Canyon, drinking water from a tap system seems redundant since the system is relatively new and "rustic", as many respondents described it. Moreover, Tapeños still frequently use the irrigation canal to collect water for domestic purposes. Cabanaconde conversely has a more 'modern' system with a reservoir said to have been constructed by MACON, the international consortium that constructed the Majes canal in the 1970-80's, but this is unconfirmed⁵⁰. Don Paulino Junco stated that "when MACON came they constructed a cistern for the village as a gift, and in that moment

⁴⁸ (Sp.) 'Irrigation Commission'; the local irrigation user-group institution

⁴⁹ (Sp.) irrigation water retention tank (like the *tsingu* of Mustang)

⁵⁰ This statement contradicts what

modernity arrived in Cabanaconde”. The concept of modernity permeates the discourses relating to water in the Colca Canyon today, and will be discussed in section 6.2. Cabaneños have not experienced any noticeable shortages with their system, however one man stated that he heard that the level of spring water had lowered. He had however not noticed a problem himself. On the other side of the canyon, the system in Tapay functions well. But as one Tapeña woman stated, “it’s nothing like the city”. Up until recently they still gathered their drinking water from the village’s *acequias*⁵¹. They experienced shortages in this system when they had to divert the drinking water to the irrigation canal due to a shortage. Thus in Tapay, the drinking water system is much more closely connected to the irrigation system than Cabanaconde.

In the following section, I will present the layers of the meaning of cryo-hydrological change in Colqueño cognizance. As we will see, the various influences, from across history and space, are just as complex as in Mustang.

6.2 The Discourses of Change

Andean farmers speak up easily and readily about the shifts in local meteorological and cryo-hydrological patterns. After all, *El Niño* and *La Niña*, the climatic cycles, changes, and enormous influence of the Pacific Ocean currents were named by Peruvian fishermen. Quechua categories and indexes such as *purmaketke* (permanent high mountain snow and ice; see section 6.1.1) also exemplify local cryo-environmental consciousness. But these farmers are also familiar and conversant with the shifting fortunes of their national government and pros and cons of technology and development as applied to their water resources. While visiting the Colca Valley, I realized the complex and multi-layered framework for understanding water and gauging change. But interestingly, imbedded amidst the complex narratives of meteorology, government and development are interspersed fragments of the previous aboriginal discourses which ruled the changing waters of Perú. These pre-Columbian narratives and Catholic-Andean syncretisms underlay much of the discourses of water resources in change in the Colca Valley today, as some of my informants hinted at during our conversations. The following texts are excerpts from some of these conversations,

⁵¹ (Sp., from Arabic *al-sāqiya*) irrigation ditch

in which my informants mentioned some of the pre-Hispanic narratives of the Colca Valley vis-à-vis environmental changes.

‘Of *Momias*⁵², Seawater, and *Milagros*⁵³’, excerpts from field conversations, Cabanaconde, Perú, January 19-20, 2008, translated by the author.

Snowmelt and ‘*La Momia Juanita*’:

*The nevado*⁵⁴ called *Ampato Volcano* belonged historically to Cabanaconde, and *la momia Juanita*⁵⁵ comes from there. But the village of *Lluta* has been claiming *Ampato* and now also *Hualca-Hualca Volcano* as its territory. Whomever takes ownership of *Juanita* the mummy takes ownership of *Ampato* and therefore the water of the *Canal of Huataq*...

- Guillermo Vera Aragón (77)

Starfish and Seawater:

*The people used to go more frequently to bless the springs and lakes and leave offerings for feast days and before planting. If in a particular year the water started drying up they would go by mule over four days to the Pacific Ocean and bring seawater and starfish to offer to a huaca*⁵⁶ for rain...

Miracle Rain:

*When I was nine years-old, Father Hugo Cáceres, called ‘Huguito’ by the villagers, returned to Cabanaconde after many years’ absence. He gave his first mass in Quechua... That year there was drought and the villagers requested he lead a procession to the Calvario de Antesana*⁵⁷ to pray for rain. So they went, in broad daylight, without a cloud in the sky, everybody sweating... On returning the people heard thunder, and by the time they reached the plaza it started raining! People cried with happiness and gave thanks to God...

- Don Paulino Junco (62)



⁵² (Sp.) mummies

⁵³ (Sp.) miracles

⁵⁴ (Sp.) literally *snowy*; referring to a snow-capped mountain

⁵⁵ (Sp.) *Juanita* the mummy; an Incan sacrificial offering discovered on *Ampato* volcano in 1995 by archaeologist Johan Reinhard after the eruption of *Sabanacaya Volcano*, between *Ampato* and *Hualca-Hualca*

⁵⁶ (Que.) a sacred site or object, anything from features in the landscape such as the mentioned springs & lakes, caves, stones, etc. to the mummified remains of the deceased, including those of sacrificial victims such as *la Momia Juanita*

⁵⁷ (Sp.) *Calvary of Antesana*; a hill near Cabanaconde topped with crosses symbolizing the site of Jesus’ crucifixion

From the 15th century forward, three successive states have attempted to exercise and control the life-giving waters of semi-arid highland Perú. The Incas incorporated the religious beliefs of all the peoples it incorporated into its empire, including the Cavana and Collagua tribes of the Colca Valley and then imposed their own symbols and systems of technocratic rule⁵⁸. In the mythos of Tawantinsuyu⁵⁹ “Andean peoples trace their roots of origin to sacred mountains, lakes, springs, and rivers. Irrigation water is generally perceived as an extension of subterranean waters, which unite lakes, rivers, and high mountains with the ‘mother lake’ (*mama qucha*), this is to say, the ocean. Together they form a hydraulic network through which gods and ancestors traveled” (Sherbondy, 1982, in Gelles, 2002: 43). The deity Viracocha sent the original people up through underground waterways to springs, lakes and rivers through which they emerged into their appointed places. These water sources, along with the stone and wooden images and ancestor mummies associated with them are Andean peoples’ *huacas* or sacred places (Sherbondy, 1982). The reference to *la Momia Juanita* concerns a long-time dispute over Cabaneños’ and Lluteños’ more primordial connections to Ampato Volcano, and thus by association the water flowing from the mountain. As Reinhard (1985) states: “the mountain gods generally exercised control over...the primary source of water on the local level. [They] directly influenced the fertility of plants, animals and ultimately humans.” (in Gelles, 2002: 43).

Under the Empire of the Spanish Crown, the state and its church did everything in its power to supplant the Inca theocracy that had preceded it. Administered by the Inquisition, the campaign of *Extirpación de Idolatrías* (Extirpation of Idolatries) aggressively sought out the *huacas* to destroy them, especially if they were images or in the form of idols or mummies (Moseley, 1992). Claims to land, place, and water were invested in these objects and their destruction caused a devastating sense of dispossession among the natives. With the slate cleared, colonial institutions controlling land tenure and resources were put into place. It is easy to imagine how precious any surviving mummies would be after the *Extirpación*. This is evident even in modern times, considering the stir that the discovery of *La Momia Juanita* caused when she was discovered on the heights of Ampato Volcano in 1995.

⁵⁸ One of the systems of rule which comes to bear on water management is visible in the *anansaya/urinsaya* division of agricultural lands and the practices of irrigation which accompany them (see Chapter 2)

⁵⁹ (Que.) the name of the quadripartite Inca Empire

Despite the tumultuous history indigenous peoples of the Andes have endured over the past five centuries, from the Spanish Conquest to present-day neoliberal and socio-economic marginalization, native meaning systems endure. In the case of ‘Juanita the Mummy’ and the seawater and starfish offerings, native Andean cosmology is preserved. However, Spanish colonial influence, such as the Catholic explanation in the ‘Miracle Rain’ account, have tried to supplant the indigenous worldview. That is not to say that syncretisms have not emerged. For instance, in Don Paulino’s story *thunder* still resonates with Andean cosmology as a symbol of the power of the *Apus*, or mountain deities but is also attributed to Saint James or Santiago (see Mishkin, 1940)⁶⁰.’ These fragments of pre-Columbian narratives and Catholic-Andean syncretisms underlay much of the discourses of water resources in change in the Colca Valley today. Yet as modernization reaches even the most remote of Andean mountain villages, changing water resources are explained with many external understandings and interpretations of the environment. The range of these myriad discourses is presented in the following sub-sections.

6.2.1 Reasons for Change

Table 6.1 summarizes the different reasons for change argued for in the Colca Valley. Due to a smaller number of respondents (n = 14), the percentages of each group are irrelevant statistically. However, the categories nonetheless show a range of responses and provide a cross section of local conceptualization of environmental phenomena. As in Mustang, the categories of responses vary on lines of local historical influences and ‘stock of knowledge’ (in Schutzian terminology; see Chapter 3), and modern influences external to Colqueño society. A mix of different worldviews permeates Tapeño and Cabaneño consciousness giving rise to plural, sometimes ambivalent rationalities.

Table 6.1 Categories of the reasons for cryo-hydrological change.

Reasons for Changes				
Supernatural Causes / Divine Punishment	Natural Fluctuations	Wasteful / Disinterested People	Climatic Changes	Global Warming

⁶⁰ According to Mishkin (1940), the Kauri people attribute thunder, lightning and hail with a mythical being called *Ccoa*, controlled by the *Apus* or mountain deities. Saint James, or ‘Santiago’ in Spanish, is also said to produce thunder, thus associating him with *Ccoa*. Many other Catholic-Andean syncretisms are constructed in Andean cosmology, including the association of Jesus with Inti Huayna Ccapac, the sun.

To begin, the category of *supernatural causes and divine punishment* was by no means as prevalent in Perú as in Mustang. People only revealed fragments of their thinking relating to discourses of a previous Andean cosmology. Don Paulino Junco's story of the saltwater and starfish offerings to the *huacas* informs of the local perception of the natural world animated by deities, with whom humans are engaged in a dialectical relationship mediated through people's actions (i.e. ritual prayer and offerings). This 'interaction' is structured by a 'transactional metaphor' where natural phenomena are personified and people 'pay' them to appease and honor them, in order fall in the gods' good favor. Accordingly, Don Paulino's story indirectly asserts that people are forced to placate the mountain deities through prayer and offerings when forced by environmental extremes. Pedro Gonzalez, the municipal *registrador* (from the vignette at the beginning of the chapter), cites a Christian argument while also inferring the modern-backward dichotomy of modernization discourse, stating that the "elderly believe that thawing is God's punishment and means that the Apocalypse is coming soon". This view asserts his modern outlook in contrast to the irrationality of the "elderly" in general who here serve as a symbol for "the old ways".

The *wasteful/disinterested people* category specifically faults humans for cryo-hydrological change in the Colca Valley. One Cabaneño stated that the reason for the decrease in the amount of Hualca-Hualca River water over the years was not due to retreating snow and ice on the volcano, but rather the cessation of the communal water-capture efforts that the village used to organize on an annual basis. The communal labor group or *faena* consisted of several small brigades of workers digging canals at the snowline to collect meltwater into a single channel, diverting it to the river to increase the flow to the village below. The annual expedition to Hualca-Hualca to dig and clean the *zanjas* or ditches is a kind of pilgrimage which reinforces solidarity between the villagers (Gelles, 2002: 72). The practice is still present in Tapay, which does not rely on Majes canal water like Cabanaconde. The discontinuation of this practice can at once result in lowered water levels and appear an erosion of social fabric. Similarly, a Cabaneño explained "some people don't like the new [modernized] system, because nobody does the rituals anymore. They aren't accustomed to this...". The "new system" the informant refers to is the state endorsed *de canto*⁶¹ form of

⁶¹ (Sp.) also *corte*; "method used to distribute water in which the water distributor begins by allocating water to landowners whose fields lie at the lower end of the canal" (Pærregaard, 1997:255) progressively upstream to

irrigation management that has slowly replaced the traditional ritualized *urinsaya/anansaya* rotation system utilized since the Inca Empire (see Chapter 2). The carelessness and “lack of discipline” of the irrigators was also blamed for less water, arguing that since people do not depend solely on agriculture in the present, they tend to irrigate for too long, allow canals to overflow, and commit other errors that result in a waste of water. The use of the sign “discipline” centers the fault of changing waters on human actions or negligence, reasserting the arguments of the discourse of modernization. Evangelist Protestantism, which is a growing church in the Peruvian highlands, also preaches “work, discipline, and ‘progress’ as moral values” (Paerregaard, 1993: 198), so corresponds nicely with modernization discourse. Paerregarrd (1997) discusses the effects of Protestant ideologies on irrigation practices in Tapay, noting that although they are only 5 percent of the population, they are having a major impact by “[placing] themselves in opposition to a mystic and ritualized Catholic church, which they consider irrational and sinful” (ibid: 198). Thus conflict emerges in the arena of beliefs—culture or meaning systems—specifically surrounding the rituals of water management.

With an individualistic attitude, Leonidas Huamaní Llica (60), a landholder in Tapay, but resident of Cusñirhua also faulted people for the lack of water, because they “lack interest to conserve and utilize water to the maximum”. According to his version of modernization discourse, it was imperative that Tapeños “follow Israel’s example” and gain a maximum benefit from their limited supply of irrigation water. His solution implies the technification of the Tapeño irrigation system utilizing drip irrigation, discussed as a solution for future drought in section 6.2.3.

Natural fluctuations and *climatic changes* both argue for meteorological changes as the reasons for change. As some respondents would insist, “when it rains, there is water, but when it doesn’t it’s dry...this is how it always is”. The *climatic changes* response, however, argues the point differently, stating that there are in fact abnormal changes occurring, but they are caused by the abnormal weather itself. This type of meteorological reason for change ‘begs the question’, but it again makes the clear connection between climatic behavior and cryo-hydrological response. While I was in Cabanaconde during the exceptionally strong rain storm described at the beginning of the chapter, it became apparent that people were very well

villagers’ fields at the upper end. The system is argued for by engineers from the state and NGO’s as more efficient than the traditional *anansaya / urinsaya* system; see also Chapter 2

informed about the weather through the Peruvian national weather forecasting service, SENAMI⁶². Gelles (2002) adds that “the [C]abaneños are also hydrological experts and possess a vast reserve of knowledge about water flow, subterranean filtration, the construction of terraces and canals, and the variations in chemical composition of river water in the different seasons of the year” (70). So their reliance on this explanation is first nature, but also reinforced by contact with information distributed by the state through modern communications.

Finally, *global warming* is the category most indicative of fluency in modern Western scientific discourse on the reason for climatic change and ultimately the Colca Valley’s shifting waters. The most memorable of instances when I encountered this explanation was again while speaking to Don Paulino Junco. While I was waiting to talk with him on one occasion, he and a few other people in his guest house were watching a news program on his television, which coincidentally began airing a segment on the effects of global warming on the glaciers of Perú. During our subsequent conversation, he not only attributed the changes he described to be occurring in terms of global warming discourse, but articulated the problem in almost exactly the same manner as the popularized and sensationalized news program had. Thus, modern popular scientific reasoning is reaching even some of the remotest mountain canyons of South America.

In section 6.2.3, I will proceed with a presentation of the Colca Valley farmers’ solutions, available and future, to cryo-hydrological change. However, before this, I exemplify two accounts of Colqueño attitudes toward environmental adversities, which to a degree frame the wider range of attitudes held by these resilient mountain meltwater irrigators.

6.2.2 Andean Tricksters

‘El Hombre Andino’ (The Andean Man), excerpt of field conversations, told by Don Paulino Junco, Cabanaconde, Perú, January 20, 2008, translated by the author.

The Andean man is like a musician, a priest, and a goat...

⁶² Sp.: “Servicio Nacional de Información Meteorológica” ; En.: “National Meteorological Information Service”

...Like a musician because he plays in fiestas⁶³, baptisms, weddings, funerals, during the planting of the chacra⁶⁴ of the cofradía⁶⁵ and charges and eats.

...Like a priest because he baptizes, holds marriages, gives mass for the dead, accompanies them to the cemetery, takes from the chacra of the cofradía, charges and eats.

...Like a goat because a goat climbs boulders that neither men nor other animals can climb, and there finds the best wild, natural plants and eats only the tender shoots.

The Andean man is prepared for everything because he's prepared to survive... it's his culture to survive!

'Los Once Héroes' (The Eleven Heroes), from Gelles (2002: 61 & 78, translated by the author)

Each night...the "once héroes", as the people of Cabanaconde would later call them, met...[armed] with picks and drills, [and] would ascend up the Hualca-Hualca riverbed, now almost completely dry...[It was] the worst drought in thirty years to ravage the community, and Majes continued to stubbornly deny the village [water]. While the plants withered in the scorching Andean sun, a virtual river ran imprisoned between the walls of a broad cement canal, its waters destined for the commercial plantations of the coast. But everything has its limit...They decided they had to use dynamite...and the rest was history...

In March of 1983, the Cabaneños opened the Majes canal in a classic demonstration of peasant resistance...



Don Paulino Junco of Cabanaconde was by far the most outspoken individual I interviewed in all of my conversations in the Colca Valley. Yet his maverick individualism seemed a wider trait of Colqueños in general, including the *Once Héroes* of Cabanaconde. But what is the source of this individualist spirit? The modern Peruvian state as it evolved in the 20th century is both populist and socialist in character. Its original ideologists such as José Carlos

⁶³ (Sp.) feast-day celebrations; parties

⁶⁴ (Que.) a cultivated field

⁶⁵ (Sp.) A religious society of villagers in charge of a Catholic saint, its festival, and other community responsibilities; 'chacra of the cofradía' refers to the field set aside by the village *cofradía* for the benefit of the priest, nuns, etc. (source: fieldwork, Cabanaconde, Perú, January 2008)

Mariátegui drew links to the pre-Hispanic past, claiming that Peruvian socialism was based on the native rather than on European models. This native model is the *ayllu* or kin-based collective farm and village unit, and source of the communal spirit of Andeans and even the inspiration for modern Perú (Mariátegui, 1943). Political activism and direct action are two options in a state which has enshrined populism and the ‘will of the people’. In addition to these, more ‘modern’, technological solutions are argued for. But even in fragmentary, syncretic form, the people still also turn to their ancient ritual practices when science fails and drought prevails.

6.2.3 Responses to Change

The available and future solutions to changing water resources that Colqueños perceive are as informative of their conceptualization of environmental events as the reasons for change. Table 6.2 summarizes the responses that Cabaneños and Tapeños gave for this particular inquiry.

Don Paulino voices above what I categorize the *adaptation* argument. Here he expresses clearly and proudly the legacy of adaptability and survival that his ancestors have passed down. In his mind, adaptation is not a passive, fatalistic measure where one awaits nature’s final judgment. Rather, it requires agency and skill, both of which the ‘Andean man’ has plenty of, according to him. Although migration, technical solutions, government coercion and aid are also forms of adaptation, this category denotes accommodation of change, or “tightening of the belt”, as explained in Chapter 5. When other respondents spoke of adaptation as a solution or response to change, they referred to the fact that they would be forced to make due with whatever amount of water they were able to appropriate. Clodoaldo Regino Oxa (60) of Cabanaconde explained that during a drought the farmers would have to share the scarcity. He added, as many others also did, that to merely adjust to scarcity is not

Table 6.2 Categories of the available and future solutions for negative cryo-hydrological changes.

	Solutions for Change							
	Does Not Know	No Solution	Ritual	Migration	Adaptation	Technical Solutions / Modernization	Aid	Government Coercion
Available Solutions	--	X	X	--	X	X	--	X
Future Solutions	X	--	--	X	X	X	X	--

enough. Adapting also entails collective action and capturing water from springs and seeps as well as furrowing the snowline in a *faena* or *corvée* labor group to increase the flow of water in the main river channel. Collective action and community-led water capture were among the most common solutions for drought that Cabaneños and Tapeños alike mentioned. A few Cabaneños told that they would simply rely on the Majes Canal to survive a drought. However, Guillermo Vera Aragón (77) of Cabanaconde warned of the precariousness of this dependency:

With three years of drought, Majes would be as much effected as Hualca-Hualca [River], and then Cabanaconde is through.. Majes saved Cabanaconde's life. We don't have enough water to survive a drought. We'll have to find jobs to survive.

Aragón thus touches on another important solution for Colca farmers: *migration*. Raúl Álvarez (51) of Tapay, adding to his support of building a diversion canal to meet the village's needs (addressed below), stated that “a canal would need a big [financial] investment, but the production [of the land] won't compensate [for the building costs]... the young people migrate away to the city, looking for a new life, and they only return for the *fiesta*⁶⁶”. Out migration means a labor drain for remote villages such as Tapay which depend on such large labor inputs in order for a viable production. Paerregaard (1997) states that “[b]ehind the rural-urban exodus which has been in progress in Perú over the past fifty years, lies a fervent desire on the part of migrants for education and a great hope for upward mobility... [and an] effort to make progress (*progresar*)” (19). He continues, adding that this cultural ideal “drives thousands of Andean youth to migrate annually, before coming of age, in order to grow up in an urban environment, to learn to speak proper Spanish and to master the *criollo*⁶⁷ ways of life” (19). *Progreso* makes migration viable for many young villagers, and those who have opted to stay and farm notice the lack of labor that this outpouring produces. Thus a ‘water shortage’ many times seemed synonymous, at least causally, with the labor shortage each place is experiencing. In Cabanaconde, some informants also mentioned migration as a response to drought, despite actually having experienced an influx and retention of their population due to Majes canal water (see Gelles, 2002). Tapeños seemed to spurn migration as a solution to either water scarcity or rural poverty. Indeed, the

⁶⁶ (Sp.) feast day

⁶⁷ (Sp.) “Spanish-speaking mestizo population inhabiting [the] coastal region” of Perú (Paerregaard, 1997: 256)

limits set by nature could be accommodated given there was sufficient human labor available to adjust to the changes.

Technical solutions or ‘modernization’ were much more commonly mentioned than *migration* as responses to drought. Informants hailing this category mentioned different engineering projects, including the building of more reservoirs to store water that would otherwise be lost downstream, and as mentioned, diversion canals. Tapeños expressed the most involved and diverse range of ideas regarding diversion canals. Imagining a ‘miniature Majes’, respondents named several different diversion projects as possible solutions to a future scarcity in Tapay. Canals from the Chico River, Molloco River (see Figure 2.4), and Guaruro River were all named as possible sources for a canal to supply Tapay’s *campiña* or agricultural lands. These three rivers are all located near Tapay, but in different watersheds “over the mountain”, as villagers said. I have only been able to confirm the location of the Molloco and Guaruro Rivers, which run through an adjacent tributary watershed of the Colca River west of Tapay. Raúl Álvarez mentioned that part of the Molloco River pertains to Tapay district, of which the village of Tapay itself is the capital. Thus the district boundaries could be used to justify a claim to this water. They noted, however, that the hamlets within the valley would probably not give up their water so easily, suggesting that the canals would spark controversy. Paerregarrd reminds that “Tapay is a district that consists of several annexes and that several of these try to gain autonomy from Tapay and become independent districts. Hence, a water claim from Molloco River would probably cause a lot of disputes over territory and autonomy in the area” (2008, pers. comm.).

Informants also referenced past technical actions taken to mitigate water scarcity, namely lining the irrigation canals with cement, which is seen as a necessary solution today as well. Under the banner of modernization, people refer to traditional earthen canals as *anticuado* (antiquated) and *rústico* (rustic), reproducing the ‘modern’ versus ‘traditional’ (‘backward’) dichotomy in the context of the Colca Valley. This movement and the people who are their proponents can be conceptualized as *individualist*, in Thompson’s terms. The ‘modern’ ideal under the banner of *progreso* are cultural, ideological shifts occurring today in the Colca Valley.

If the proponents of technical solutions and modernization are individualists, then the respondents who did not know how it would be possible to solve a drought are the *fatalists*.

Those who gave the *does not know* and *no solution* responses fit into this classification. The Tapeño man claiming *no solution* claimed that they would not even be able to build another *estanque* or irrigation reservoir if they wanted to “because the terrain is too steep”. Ana Rosmery Rodríguez Benavides (28), the wife of Tapay’s mayor at the time claimed she did not know what solution would solve a future drought. But she did mention with certainty that “Tapay’s water *will* dry up, and the people of the village are thinking of bringing water in a canal from the Molloco River”. Despite her uncertainty regarding surviving a drought, this response shows a different side to her reasoning. She also revealed a more ‘modern’ explanation, stating that “if [they] had a *regidor*⁶⁸ who they paid, then water would be used more responsibly”. Being from Cabanaconde, she is no doubt accustomed to the state *de canto* model of irrigation (see 6.2.1), so sees it as a logical shift for Tapay as well. Overall, Ana Rosmery’s viewpoint, although expressing uncertainty about the future state of Tapay’s water, is also influenced by the modernization and technification discourses. This is another case of discursive ambivalence I encountered in the Colca Valley.

The most common means of acquiring aid for cement and pipes for the *tecnificación* (‘technification’) of water works, as the locals called it, is through various government agencies and NGO’s. Respondents who mentioned this method are under the *aid* category. The Tapay residents who proposed various diversion canals to alleviate the village’s water needs also noted that in order for this to be a viable solution meant they required “strong investment”. FONCODES, or the ‘Social Development Cooperation Fund’⁶⁹ is the main channel through which funds are allocated to communities for development projects, I was told. Another resident of Tapay, Hernán Salas (60) stated that it was not only necessary to solicit the government or NGO’s for funding, but that “they have to cry in front of [them]”. He said this with sarcasm, yet a grain of truth. *Crying* in front of the government or official aid agencies and organizations reveals the theatrical nature of requesting development funding, as well as the roles the recipients and donors are obligated to play. Raúl Álvarez noted, however that the increasing reliance on the government and NGO’s is *mal acostumbrando a la gente* or “cultivating bad habits in the people”. He continued,

⁶⁸ (Sp.) Water manager

⁶⁹ Sp.: ‘Fondo de Cooperación para el Desarrollo Social’

Our ancestors were better workers. Now more NGO's have appeared who have habituated the people... The NGO's said they would give incentives for the people to do [development] work. But before, the people worked out of necessity.

In the history of the inhabitants of the Colca Valley, the villagers have not just waited for the government to help them in times of resource scarcity and “cried for aid”, but rather have actively taken fate into their own hands. The *Once Héroes* (Eleven Heroes) of Cabanaconde responded to the needs of their withering community in a “classical display of peasant resistance” (Gelles, 2002: 78). In 1983 the village was caught in the throws of a prolonged drought. The Majes-MACON Project had made hollow promises to improve the drainage of the Hualca-Hualca River and restore the Huataq Canal to help the village reclaim abandoned agricultural lands. The villagers had also appealed to the government repeatedly for help (ibid, 76). When they lost their patience with Majes-MACON and their requests to the government fell on deaf ears, eleven villagers united and took matters into their own hands, blowing a hole in the Majes canal with dynamite in March of the same year. The action sparked a conflict between the government and the villagers, but when the authorities came to arrest the responsible individuals, the entire village took blame for the act as a symbol of their struggle. Eventually, the administrative entity of the Majes canal, called ‘AUTODEMA’,⁷⁰ “fearing the possibility of future conflicts agreed to cede 150 liters of water per second to Cabanaconde” (ibid, 79). A few individuals in Cabanaconde cited this action as an example of how they could *coerce* the government in addition to the other solutions listed to deal with a shortage of water. I will discuss more about how this particular method of legal manipulation is part of the meaningful repertoire of actions that Colca villagers and Peruvian peasants in general can take to decide their own fate in opposition to government control in the following chapter.

The final solution mentioned to have worked in the past for a water shortage is *ritual*. Don Paulino Junco recounted how the use of rituals based on both Catholic and pre-Hispanic Andean beliefs were performed to remedy water stress during times of drought (illustrated in the epigraphs at the beginning of the present section, 6.2). Ritual traditionally has an important role in agricultural and irrigation activities in Cabanaconde and Tapay (see Gelles,

⁷⁰ Sp.: ‘Autoridad Autónoma de Majes’; En.: ‘Majes Autonomous Authority’

2002 and Paerregaard, 1997). *Pagos*⁷¹ are necessary ceremonial offerings which include “seeds and leaves of the coca plant (*Erythroxylum coca*, var. *coca*), *qorilibro* and *qolqelibro* (small objects of gold and silver), *pichuwira* (fat from the breast of llama), maize of three different colors, *cochayuyo* (sea weed), and starfish” (Paerregaard, 1993: 195). Although people still make *pagos*, they are performing them with less frequency. Hubert Oxa of Cabanaconde expressed furthermore, that the symbolic meaning of the *pago* is changing altogether. The *pago* or ‘payment’ is no longer with smoke, prayer and coca leaves to Pachamama, *huacas*, and Hualca-Hualca Volcano or the other *cabildos*⁷² for rain and *deshielo*⁷³, but to the government with cash for 120 liters of water per second from the Majes canal.

6.3 Summary

From the attitudes expressed about the reasons and solutions for the cryo-hydrological changes described in Colca, we obtain a profile of the varying discursive positions that Peruvian mestizo peasants utilize. From these perceptions, we can infer the societal and cultural influences in their cognizance of water and the changes which affect it. From the mythological to the empirical, people use a variety of internal and external explanations and solutions for how and why their cryo-hydrology is changing. When their labors fall short, they depend on ritual and political action for their survival.

The next chapter presents the comparison of the perceptions and survival strategies of the Colca Valley residents with those of Lumbuk Canyon in order to arrive at a better understanding of the influences underlying the perceptions of changes just presented in both places. A discussion of Thompson’s Cultural Theory and its applicability for these cases is also presented.

⁷¹ (Sp.) literally ‘payments’

⁷² (Sp.) A ruling body of local representatives; however, in the Colca Valley, *Ccabildos* are synonymous with *Apus*, or mountain gods

⁷³ (Sp.) meltwater



Photo 9 Highland irrigators of Tapay, Colca Valley



Photo 10 Highland irrigators of Dhakarjhong, Mustang

Chapter 7: A Tale of Two Ranges

7.1 Introduction

In Chapters 5 and 6, we have seen the perceptions of agro-pastoralists in both Mustang and the Colca Valley concerning fluctuations in their cryo-hydrological regimes. In both cases, villagers reveal that significant environmental changes are occurring, each articulating in distinct ways. Although there are variations in the magnitude and trajectory of change, my informants have generally observed less snow on mountain peaks, shifts in the timing of the seasons, and change in flow of local springs and streams, having implications for irrigation in each place.

In this chapter, I will shift attention to a comparison of the two cases presented in this thesis to gain deeper insight into the nature of the symmetries and asymmetries between these two cultures of habitat. My inquiry will frame native perceptions of change through the terms of Thompson's Cultural Theory to analyze the challenges and uncertainty that cryo-hydrological change poses for these two groups of highlanders.

7.2 Symmetries and Asymmetries

This comparison will not conclude with broad generalizations about global climate change and warming on mountain cryo-hydrological systems and their people. The cases of Mustang and Colca in contrast, with a discussion of symmetries and asymmetries will provide a concrete basis for greater understanding of peasant communities facing environmental change.

7.2.1 Symmetrical Aspects

To begin with, the cases of Mustang and the Colca Valley are remarkably analogous despite the distance that separates them. As the Lammergeier and Condor⁷⁴ fly, Mustang and Colca are almost as far from each other on the globe as they can be. Recalling Chapter 2, the environments of both, Mustang and Colca are strongly determined by extreme regional

⁷⁴ Large, carrion eating scavenging birds of the Himalayas and the Andes, respectively

rainshadows, so both experience at least seasonal aridity. They are both important headwater areas where meltwater from mountain glaciers and snow feeds streams and rivers. Global warming in each place poses an especially grave threat due to the fragility of mountain snow and ice. This is especially true in micro-watersheds on the margins of the snowline, where a decrease in snow and ice accumulation could spell disaster for people directly dependent on these sources of water. Even if rainfall increases (due to the displacement of snowfall as a result of increased atmospheric temperatures), this would not compensate for snow or ice hydrologically because immediate streamflow would increase while long-term discharge would decrease. The greatest impact would be felt in dry months when meltwater is most crucial for agriculture.

The other obvious parallel between Mustang and the Colca Valley is agro-pastoralism and irrigated farming. These traditional technologies are well suited to high, dry mountains. Likewise, arid conditions allow for a combination of irrigated agriculture and pastoralism. The environment is not causative *per se*, but rather prohibitive or permissive of this technology. This fact may at first seem mundane, but given the independent development of these livelihood methods in two locations separated by such a great distance, it is anything but. Other aspects of these distance-defying systems, furthermore, are the strikingly similar agricultural terraces and irrigation canal structures of both. Functionally they utilize the same adaptation for intermittent or ephemeral streamflow: irrigation reservoirs. These *tsingu* in Mustang and *estanques* or *reservorios* in the Colca Valley (Tapay specifically) serve the purpose of collecting stream water during the night for irrigation during the day⁷⁵. Other more elaborate adaptive methods—aqueducts—were also mentioned in addition to this. In the past, long before cement and PVC pipe⁷⁶ were invented, much less used for irrigation, these societies adapted to the conditions of their need—whether drought, increased population, or perhaps even the desires of a powerful king⁷⁷—by constructing aqueducts. The Syang Canal of Lumbuk Canyon and the Huataq Canal of Cabanaconde are two examples of

⁷⁵ Beyond this, both systems even have their own methods of adapting or managing low streamflow. In Mustang, low water requires nighttime irrigation to benefit as much as possible from what little there is. In conditions of high stream discharge, the villagers only irrigate during the day. In the Colca Valley (Tapay in particular), conversely, villagers only irrigate during the daytime when they experience low streamflow. They are forced to irrigate throughout the night, however, when water levels are higher, to prevent spill-over from the reservoirs. (source: field conversations)

⁷⁶ A common type of plastic pipe used for irrigation and other plumbing in Mustang and the Colca Valley

⁷⁷ Locals of Dhakarjhong speak of *two* different parts to their village: the old and the new. Old Dhakarjhong is a ruined fort perched atop a crag at the entrance of Upper Lumbuk Canyon, upstream and opposite from present-day Dhakarjhong. It is said that a king lived there, and below the *dzong* or fort (Tib.) stands a large flat stone placed vertically, half buried and painted white. Only the king, they say, could tie his horse to the stone.

such ancient canals built by the ancestors of the present day inhabitants of Mustang and the Colca Valley, respectively. These structures were no modest feats of engineering, but rather the monumental structures of their day, admired by all even now. The Syang Canal had to transport water over a 4,000 meter-high pass, and the Huataq Canal, with Inca engineering channeled water 35 kilometers over the high pastures above Cabanaconde from a source originating near Ampato Volcano (see Figure 2.3)⁷⁸. These structures are remembered with fondness and pride by locals in these areas as signs of their ancestors' "singular dedication to farming and surviving" (Pedro González, Cabanaconde; echoed in Mustang). As Lumbuk and the Colca Valley's contemporary farmers adopt new technologies, including cement and plastic pipes, and receive funding and aid from NGO's and government development agencies (such as CARE International and the District Agriculture Office in Nepal and FONCODES in Perú) the hope of reviving such large-scale projects is renewed. Locals in the Lumbuk area speak longingly of the Syang Canal. In Cabanaconde, focus on Huataq has quieted since the *Once Héroes* blasted a hole in the Majes canal in 1983⁷⁹, but people still remember and mention it. Tapay villagers did not mention any ancient canal, but with today's technological and funding potentials have started dreaming about transferring flows from the Molloco River, among others (see Chapter 6), with a transmountain canal crossing a watershed divide. However, as respondents noted in both areas, although they discussed the possibility of government sponsored construction, no further plans were drawn. Aid agency authorities saw no economic interest or incentive for such costly projects since they would most likely not generate profits for anybody beyond the communities themselves.

Canal building is not the only arena into which contemporary market discourse and culture has reached though. Labor, which is traditionally communal and shared in Mustang and the Colca Valley, is increasingly outsourced to migrant laborers today. Both areas have similar local labor arrangements, such as the shared labor *ayni* system in the wider Andes and the shared labor system I observed in Nepal. These arrangements are critical components of the agricultural cycle in each place. The principle of shared labor is practiced by farmers for everybody's common benefit. This mutualism or communalistic attitude is important for people's collective survival in arid mountain environments. However, as more individuals

⁷⁸ 'Huataq' is a Quechua word translating directly to 'tied', connoting the difficulty posed by the canal's construction

⁷⁹ Following the act of the Eleven Heroes, the Majes-MACON project agreed to give Cabanaconde access to the canal's water, but only on the condition that they forfeit their claim to the Huataq Canal.

migrate away from their Mustangi and Colqueño villages for the cities and modern lifestyles, the villages experience a labor vacuum. As mentioned in Chapters 5 and 6, this has induced a shift in local production as landless migratory workers from neighboring regions in both places replace emigrated farmers. The only way for farmers who stay behind to compensate landless migrant laborers for their help is with cash. Thus the traditional shared labor economy is transforming today because of the influence of the modern cash economy in both areas.

Clearly, the issue of labor is closely linked with that of migration in both Mustang and Colca. Villagers emigrate to the major cities in their respective countries, such as Pokhara and Kathmandu in Nepal, and Arequipa and Lima in Perú, and even across national boundaries to work overseas. The job market, greater access and participation in the market economy, good education, and “a better life” were all reasons mentioned for moving away from both the Colca Valley and Mustang. Tenzing Gurung (46) (the *kemba* of Dhakarjhong during fieldwork), although adamantly opposed to emigrating himself nevertheless sent *all four* of his children, aged 11 to 17 to study in Kathmandu to receive an education. He stated without scruples that he and his wife would remain in Dhakarjhong until their death and be the last farmers of his family. Although seasonal migration during the winter to work in the cities and to trade in India is common practice in Lumbuk—I would even say an adaptive measure for living in a peripheral, arid mountain environment—increasing numbers of permanent emigrants are drawn away from this peripheral highland area. Again, the labor vacuum created by migration is a big issue in both places. In regard to this, I find it very interesting that in *both* places, when I asked about the reasons for observed climatic and cryo-hydrological changes, respondents blamed *people* many times. In Mustang, again, the forces of *kalatooah* and *lha mengyeta* (see Chapter 5) were jointly responsible for “everything getting worse,” including people’s attitudes. This erosion of moral fiber made people “lazy”, and in turn they would go to live in the city instead of planting and irrigating their *shing* (fields). A middle-aged man named Lucho who I met near one of Cabanaconde’s reclaimed lands told me in passing that “without water there is no life...everyone leaves to wherever,” implying that water scarcity coupled with a farmer’s meager earnings are concomitant with outmigration. The decrease of active farming and irrigation due to outmigration has caused a drain of exchange labor. Thus, *it is* possible for cryo-hydrological change, at least in part, to be caused by people, or rather the lack thereof.

The last symmetry of note is the growth of tourism as a livelihood option for villagers in both areas. In Mustang, ACAP has been successful in attracting increasing numbers of trekkers along the ‘Annapurna Circuit’ trail, to whom some villagers cater with ‘tea houses’ located on the trail proper. The road through the Colca Valley has greatly improved access to the remote canyon from Arequipa, and today many tourists contribute to the local economy by visiting to see Andean Condors and the “deepest canyon on earth” (even though many Himalayan canyons are deeper, including that of the Kali Gandaki). Even far-flung places such as Tapay attract regular trekkers wishing to experience the Colca Canyon, but further off the beaten path that is Cabanaconde. However, this economic arrangement, although present in both places, is largely a function of aesthetics and the wealth of tourists. As a result, as a livelihood option it is more independent of the environment and the changes that affect it⁸⁰. This fact was of some reassurance to villagers when we discussed how they would survive a hypothetical future drought.

7.2.2 Asymmetrical Aspects

The analysis of the asymmetrical aspects of Mustang and the Colca Valley is also helpful for buttressing our understanding the socio-environmental processes of cryo-hydrological change in each location.

Outward cultural aspects are the first major dissimilarities that emerge, which as we have seen, influence the differences in cognition of observed change. The most noticeable of these, in turn is religion. It would be too easy to state simply that Mustangis are *Nyingmapa* and *Sakyapa* Tibetan Buddhists, and Colqueños are Catholics and leave it at that. Such labeling overlooks the important aspects and consequences of this dissimilarity. The Tibetan Buddhists of Mustang by and large have enjoyed more continuity in their belief and ritual systems than the Collagua and Cavana peoples of the Colca Valley, who have been conquered and reconquered over the centuries. Empirically, this was evident in the stories that people told me in each place. In Mustang, time and again I encountered incredible oral narratives and elaborate myths—like those of the Arya Lama and the Thakhali *Subbhas*—which were rich in symbolic meaning and incredibly detailed. In the case of the ‘Curse of the Arya

⁸⁰ Of course, water scarcity would likely have costly implications for the tourist industry, but considering that there is active tourism in Upper Mustang (which is drier than any place along the Annapurna Circuit) as well as the hyper-arid Atacama Desert proves that tourism can still be viable, albeit logistically drier.

Lama', I even encountered several different versions of the story in the same place, mostly between Dhakarjhong and Phalyak. Regarding the reasons attributed to change, I encountered a much higher frequency of supernatural cases in Mustang than in the Colca Valley. Even if this is not definitive proof that Mustangis rely on traditional explanations for environmental fluctuations more than Colqueños, it is nonetheless a significant defining trait of Lumbuk villagers in contrast to their fellow agro-pastoralists in the Colca Valley. The cosmological views expressed in regard to change and appeasing the nature spirits in the Colca Valley were only fragments, as compared to the full narratives of Mustang. However, the mention of the starfish and seawater offerings as well as La Momia Juanita, the "Damsel of Ampato Volcano", as she is referred to endearingly in Spanish, indicate that the indigenous foundational legends are still in the cultural memory of Colqueños. The folk Catholicism practiced by Colqueños, and its many syncretisms with the *Apu* and *huaca* worship of ancient Andean religion, is becoming ever more fragmented. Raúl Álvarez (51) of Tapay hinted at the changes that Protestant evangelists are bringing to the village when he mentioned that the village stopped going on procession with San Clemente (Saint Clement), a locally revered Catholic saint taken to the irrigation reservoirs during droughts. Changes brought by the modern market economy are also having repercussions in Colqueño religious traditions, as is the case with the *pago* or coca leaf offering to the *huacas* and the "Earth Mother" goddess, Pachamama. Again, Hubert Oxa pointed out that today the *pago*, or literally 'payment' has become a tax to the government to use Majes canal water. This makes evident the symbolism of this modern day economic 'tribute', which is just another version of a transaction metaphor for Colqueños, however to very different governments, spiritual and national.

Although the cosmological foundations and ritual practices of Mustang enjoy relative continuity, while those of the Colca Valley have radically changed, rituals associated with irrigation system maintenance is yet another *symmetrical* aspect between Mustang and the Colca. Maintenance projects in both places are accompanied by religious rituals (see Chapter 2 for Mustang, and Paerregaard, 1994, 1997 and Gelles, 2002 for the Colca Valley). As I have mentioned, these rituals are important for the community solidarity that they create, and for insuring that "knowledge of the rules [of water management] is evenly distributed throughout the community, rather than being concentrated in the hands of the water distributor" (Trawick, 2001). Thus, rituals and the prayer ceremonies accompanying them foster community participation, facilitate action, and strengthen community ties and norms.

The outward differences between the specific ritualization of management between Mustang and the Colca Valley appear to be based solely on cultural-historical differences. These correspond to Colca's *anansaya/urinsaya* system and Mustang's *tungba* and *churi* water rotation system, which are both based on their own cultural logic. Again, the Colca's systems are undergoing yet other changes, such as the state imposed *de canto* system and the Protestants' iconoclastic view of water management rituals. Despite these imposed asymmetries, ritual management of water remains a shared characteristic between Mustang and the Colca Valley.

Amidst these asymmetrical aspects of management patterns, one regularity or symmetry did come to light: the difference between centralized and decentralized control over water. This is evident in the lone case of Tapay where the where number of available water sources has had a decentralizing effect on the authority over water in the spread-out village (Paerregaard 1994, 1997). Dhakarjhong, Phalyak, Pakling and Cabanaconde all have central authorities in charge of controlling water, and few have more than one irrigation water source. This is of interest for the on-going debate over the ecological control of water and cultural complexity that dates back to Wittfogel's Hydraulic Hypothesis (1957), and which I will discuss more thoroughly in the Conclusion to this thesis.

The final asymmetrical aspect between Mustang and the Colca Valley concerns the interesting socio-cultural reflections that Mustangis and Colqueños engage in through story telling and action. In the stories of the Arya Lama and the Thakhali *Subbhas* in Mustang and the heroic actions of the *Once Héroes* in Cabanaconde, the roles of the villagers as actors in the world are distinctly defined. In Mustang, through two different narrative accounts, the villagers cast themselves as the perennial victims of the mischievous deeds of picaresque outsiders. The villagers are always portrayed as well-intending and naïve, suffering the consequences of a more powerful player's game. Both the Arya Lama and the Thakali *Subbhas* hold higher power, whether supernatural force or political privilege, both to the detriment of the villagers. Thus the logic or moral of the stories, seems to argue that *water is scarce because of the inherent powerlessness of common men*. This self-portrayal of powerlessness is the exact opposite of the heroes in Cabanaconde's more contemporary act of social resistance. I assert that this act of defiance is collective and stems from the communal spirit of the Andean *ayllu*. The Eleven Heroes enjoyed the support of the entire village who collectively resisted the authorities when they came to arrest the perpetrators. Cabaneños defied the power of the state

and stood up for their rights, a historical feat still celebrated by the community. With direct collective action, they reinforced their sense of social solidarity, as actors with influence and power in the world.

The discussion of the roles of these different roles—the victim in Nepal, and the hero in the Colca Valley—leads us to the next phase of this chapter, which asks how the villagers, as actors, respond in the face of the environmental uncertainty defined by the cryo-hydrological changes they have noticed and conceptualized. For this I turn to Thompson’s Cultural Theory and the typologies posited therein to assess the validity of framing cultural attitudes in my cases.

7.3 Thompson’s Typology: Evidence from Nepal and Perú?

Michael Thompson’s Cultural Theory has been utilized by environmental researchers to deconstruct the regional crisis narrative known as the Theory of Himalayan Environmental Degradation or THED (see Ives, 1987, 2004, Ives and Messerli, 1989). This critique has clarified the roles people were actually playing within the complex processes involving geo-physical forces and human activities. Thompson’s theory defines and explains how five broad culture types fit into one parsimonious model corresponding to different ‘myths of nature’ (see Figure 3.2). These cultures exist in the world in a “mutually exclusive and jointly exhaustive” interrelationship (Thompson, et al., 2007: xxxviii). This Cultural Theory, functions as a guide for describing societies and their cultural make-up heuristically as well as to serve as a full explanatory framework (see Thompson et al., 1990, Thompson, 1995, Thompson and Gyawali, 2007, Mamadouh, 1999). The heuristic guide is useful in analyzing perceptions based on the ‘myths of nature’, and is the approach I will use to analyze the mountain agro-pastoralists of this study. Through their perceptions of cryo-hydrological change—that is, through their view of nature—we can characterize their reactions to the environmental changes affecting meltwater irrigation practices. This localized discourse can aid in understanding this complex and uncertain global problem with potentially far reaching consequences for agro-pastoral peoples. I will discuss the human-environmental scenario of this thesis—glacial ‘melt-down’ or ‘the big thaw’ (Bierling, 2007) as it has been sensationalized—in order to assess how diminishing meltwater resources will come to affect human settlement in Mustang and the Colca Valley.

In one example, Thompson and Gyawali present a picture to illustrate their point about the roles that individuals and groups of people play in a situation of environmental uncertainty (Thompson and Gyawali, 2007). For this analysis, I will apply the same approach for the cases of Nepal and Perú. Now, let us imagine a photograph.

First, in the Lumbuk Canyon area, we see in the foreground standing a farmer who has just finished showing me his drying-out apricot and apple tree saplings on a rather desiccated agricultural terrace. This is land just beyond the reach of irrigation water. Behind him, uphill, verdant barley fields wave in the wind. In the middle-ground of the picture, you can see a few rooftops from his village, and in the background a mountain peak looms above. It still has a touch of snow blanketing a steep talus slope near the highest serrated peak of the sawtooth range. It is April, and the temperature rises with each passing day as spring advances. The farmer of our scene, like all the other agro-pastoralists here looks nervously up



Photo 11 Pakling Farmer in his dry field, melting snow above

to the peak, hoping the snow and resulting snowmelt, will last into the hot summer months long enough for the buckwheat harvest. If the water does not last, then rain is the only hope to bring their crops some relief. Uncertainty and anxiety overshadow our picture. But water scarcity is already endemic here, so the severity of the situation is compounded. The potential effects of global warming include a reduction in the accumulation as well as accelerated melting of the mountain snow and ice. So will the barely fields waving in the wind dry up as global warming exacerbates water scarcity here?

Will agriculture continue to be a viable livelihood in these Himalayan villages, or will the villagers decide to cater to tourists? Or in the end, will they just migrate away to Pokhara, Kathmandu, India or even Japan or the United States (which may be experiencing their own water related problems)? These features constitute our scene, and are the framework for our focus: the mountain meltwater used for irrigation.

With the stage set, we can stop for a moment and point out a few elements of such a picture. My construction of this story shares a central focus with Thompson and Gyawali's (2007). An entire way of life is at stake. The keystone is the village's meltwater, on which their irrigation practices, agriculture and livestock depend. It is their most fundamental resource and also their most endangered one. Thus, we have to ask, how should we approach this problem? In fact, Thompson asserts, there are many different approaches, specifically five. These, in turn correspond to the five 'ways of life' with their associated 'myths of nature'. Since they all hold their own definition of the problem, which supports their perceptions of and interests in a mutually reinforcing cycle, these five positions are defined by "contradictory certitudes" or "plural rationalities".

Who are the people or groups competing to define the problem in our scene? Let us begin with the man who is standing in my picture and the other agro-pastoralists of Lumbuk Canyon, who Thompson labels *fatalists* elsewhere (see Thompson, 1995: 32)⁸¹. The villagers believe that the reasons for observed changes are due, in order of highest to lowest frequency, to supernatural causes, changing weather, normal natural fluctuations, 'does not know', ecological disturbances and changes, water sharing, and air pollution and global warming (see Figure 5.1). These reasons all fall into emic categories for change. Furthermore, they all give a definition of the problem of cryo-hydrological change, which in turn frames available approaches to mitigate it. These include, from highest to lowest frequency, rituals and prayers, technical solutions (cementing canals, installing pipes, building canals or aqueducts), no solution, collective or communal village action or labor, adaption or accommodation to the changes, soliciting of aid, and banning air pollution (see Table 5.2). These approaches vary widely and all but 'no solution' provide an active answer for mitigating water shortage or scarcity.

⁸¹ Thompson states here that the Himalayan hill farmer is *fatalistic* because "[t]here are as many problems as there are localities. Across-the-board solutions will only work if they can be negotiated down into these localities" (Thompson, 1995: 32)

Here, I define prayer and ritual as active rather than passive responses to mitigate such problems. As I have already observed, *shyapten* rituals and *torma* offerings by a *lama*, reinforce community solidarity and inspire collective action such as canal maintenance and cleaning. Thus, a community with little access to technological means for mitigating scarcity, is still able to harness the strength of their own communal labor force --the *lengyi* and *mepta* systems. Prayer and ritual help to buffer, approach, and manage water scarcity problems. Ritual activities during community labor events like the ones I observed and participated in Dhakarjhong reveal that these mountain villagers are proactive in their resource management practices and in their attitude towards handling water scarce conditions. I also observed Dhakarjhong village begin the construction of a new drinking water tank to replace the present one that was drying up and in disrepair. Thus, they are able to actively negotiate solutions down into their locality, with or without the technological means available to them through the Nepali state VDC offices or through NGO funding. When these villagers think about available solutions to deal with water scarcity, they are not “passive” as Thompson labels *fatalists* and ‘hill farmers’. Through their agency and work “for the common good,” they more closely resemble *egalitarians*.

A call for solutions to a hypothetical future scarcity—when uncertainty rules—elicited very different responses. In order of highest to lowest frequency, these were migration, technical solutions, no solution, prayers and rituals, adaptation or accommodation of the changes, soliciting of aid, and collective action (Figure 5.2). In this scenario, the villagers can be said to be more truly *fatalistic* because migration is the most frequent response. When the villagers’ ability to control their ‘fate’, in a situation of increasing uncertainty, they seem to become more *fatalistic*. However, a large percentage of villagers still opt for technological solutions, as well as adaptation or accommodation of change, as well as prayers and rituals. Even though the uncertainty of a future scarcity leads many villagers to consider out-migration, the village social fabric does not totally unravel. Villagers still see the mutually reinforcing activities of ritual and prayer with community labor buttressed by technological solutions as a rational solution. Thus, it seems that the uncertainty of future climate change and water scarcity leads many villagers to ‘passively’ give up and migrate away, however, many more retain their communal resolve and *egalitarian* spirit to maintain their community under stress.

The other 'ways of life' in this picture are not directly visible, because they lie outside the immediate frame. The *hierarchists* are the government offices, such as the VDC, the District Technical Office (DTO), and the District Agriculture Office (DAO), among others, who see the solutions for scarcity as devised by their "certified experts" (Thompson, 2007: xxxiv). ACAP is also in this group, however geared more toward conservation discourse rather than the development discourse of the VDC, DTO and DAO. The *individualists* could be seen as the individuals, like Ongjuk Gurung of Dhakarjhong, who is a proponent of complicated hydrological projects, like the Syang Canal and building a dam on the Lumbuk River for water storage. The *fatalists*, in turn would be those individuals who time and again are neither able to understand the reason for change nor propose solutions for it.

In picture from the Colca Valley, a strikingly similar scene emerges, depending on whether the picture is taken from Cabanaconde or Tapay. With their legacy of the Eleven Heroes, Cabanaconde villagers are quite *individualistic* in character. Their problem of water scarcity has been solved by their cunning and boldness. With additional water resources, the area of reclaimed agricultural lands has retained the population since farming can be pursued as a viable, profitable livelihood. In Tapay, however, people are migrating away: "even whole families leave", one resident told me. Meltwater is diminishing as well, and so people cannot irrigate. In the context of available solutions, some hold a *fatalistic* 'no solution' attitude, but despite the resource scarcity of today, many people support accommodating and adapting to change and pursuing technical solutions to make irrigation more efficient. Colca has its *hierarchies* as well, including FONCODES and the local district and provincial governments, who distribute funding aid. It seems a very *egalitarian* practice to gather the community into a *faena* or collective labor group, to construct *zanjas* or small channels at the snowline to combine water sources to in order to increment the flow downstream for the villages. These different approaches to the problem of water scarcity allow the actors to address the problem based on their contradictory certainties.

However, despite the fact that it is possible to pinpoint different culture types within this picture, Thompson's approach does not seem so clear-cut and definitive as it claims. The first problem is how to delimit who belongs to the supposed 'culture types'. Is it just an individual or is it a whole group of people? And how big is this group of people? In his own characterization of the *fatalist*, he seems to just group the 'hill farmer' or meltwater dependent agro-pastoralists very generally into this group, without recognizing that there are actually

many different rationalizations of a problem even within such a small group. Furthermore, many people seem to display contradictory perceptions, revealing a deeper ambivalence about how a problem should be approached. This explains the dissonance between their perceptions and actions. If this occurs in Thompson's frame, the 'compatibility condition' is violated, and people's thoughts no longer concur with their behavior. This theory claims that people can change from one 'way of life' to another, but what if ambivalence in perception is a perennial aspect of the human condition?

Even in Thompson's own examples of labeling actors in terms of culture types, I find it difficult to distinguish whether the different types are meant to help understand perceptions of nature and its uncertainties, or whether it aims to describe the relative positions of groups or individuals with certain points of view within a given *discourse*. When people define something that they have a vested *interest* in, then a variety of actors emerges to debate the object of interest. Within this debate, relations of power appear, and the discourse veers toward hegemony of the most powerful players if their perspective goes unchallenged or unchecked.

In the analysis of perceptions of cryo-hydrological change, in order to arrive at an understanding of the problem from different cultural angles, it seems more helpful, at least in the cases presented in this thesis, to understand the different discourses of change that influence people's perceptions of it. If we look at how different actors within society understand change, we may come to realize that there are many more vectors in a discourse than simply four, or even five. Conversely, there may be much fewer. In Aase's modification of Peirce's *semiotic triad*, each actor has a particular interest in the object to which they refer, based on their social status (see Chapters 3 and 4). Villagers native to Lumbuk Canyon, for instance, speak openly about different reasons and responses to changes in their precious resource, however tenant farmers from Dolpo living in their absentee landlord's house do not have any say about solutions, or even reasons for change, because they do not enjoy the same legitimacy in place. Thus the relative position of the actor can tell us more about the social complexity which underlies different actors' perceptions. Understanding the social dynamics which inform perceptions may help us better determine how a group of people thinks about, plans, and reacts to change, rather than placing them in predefined roles, as Thompson does.

In response to my central theoretical question about how Cultural Theory charts the trajectory and magnitude of change through the eyes of our agro pastoralists, I have discovered the limitations of labeling people and communities in predetermined ways. Rather, we can better characterize reactions to cryo-hydrological change by listening for *emic* categories to emerge in native discourse and better understand how people imagine problems and create solutions for such complex global problems on such a local stage.

Chapter 8: Conclusion

The responses to extraordinary climate variation articulated by mountain peoples in the Trans-Himalaya of Mustang and the Inter-Andean Colca Valley give us profound insight into how they understand the environmental risks and uncertainties they face. The meanings attributed to change and its possible causes, are revealed to be multi-layered and complex, clustering around plurality and ambivalence, certainty and uncertainty. Each place experiences a unique set of intersecting environmental and cultural factors. At opposite ends of the planet, the highlands of Nepal and Perú share similar and unsettling experiences. The shifting of waters stirs discourses from the deep, and reveals the myriad ideations, local and global, indigenous and exotic to Mustangi and Colqueño cultures. Based on cultural and empirical perceptions, people choose from a broad menu of explanations, since there are numerous meaningful ways to conceptualize what is occurring in their cryo-hydrological systems. The same is true for the adaptive measures people have taken and envision taking in response.

Based on the findings of this inquiry we see that the problems of retreating snow and ice are serious, yet the implications for highland agro-pastoralists are still uncertain. To deconstruct the ‘melt-down’ scenario, Thompson’s Cultural Theory has proved useful. But people’s actual perceptions of change are more complex, ambivalent, and contradictory than his cultural typology and its ‘myths of nature’ have anticipated. As a totalizing theory, Thompson has proven too general and rigid to account for shifting attitudes in regard to changing waters. The mountain “villager on his remote hillside” (Thompson, 1995: 37) is not merely a *fatalist*, but embraces other ‘ways of life’ as well. In some cases the farmers’ attitudes even seem to conflate multiple ‘myths of nature’. Although Thompson tries to pluralize and mediate the debate surrounding environmental problems, he ultimately relies on over-generalization, and the stereotyping of actors. In order to hear different voices experiencing change and to understand them through cultural analysis, we should be cautious of projecting pre-defined ways of thinking and constructions of reality on them.

Tucker (1999) and the post-development thinkers would also disagree with Thompson and counter his nomothetic vision of reality, stating that:

Totalizing theories by their nature colonize and subsume other histories and existence rationalities. These theories are essentially imperial and cannot do justice to the diversity of discourses and cosmologies to be found in different societies. (11)

I have found that it is important to avoid obscuring local discourses and cosmologies, for they provide insight and understanding of complex reactions to global phenomena. Local *emic* categories for cryo-hydrological change have revealed more about farmers' consciousness of 'melt-down' than Thompson's theory was able to expose.

Idiographic approaches utilized in this thesis, including Aase's (1997, 2007) have proven more useful than Thompson's typology in the final analysis. As they observe the world that surrounds them, people imagine and construct sometimes divergent narratives, always rich in cultural and environmental memory. Their long term tenure on the land has enabled them to read landscape and the telluric memory that it contains.

Fascinating patterns have converged in my comparison of the culturally perceived change in Mustang and Colca. The symmetries and variations between the two cases are remarkable in their concurrence with Steward's concept of the *cultural core* and the *outer core*. The symmetrical points of coincidence are agro-pastoralism and its rituals, local labor arrangements, centralized versus decentralized irrigation management, and migration. These correspond with the features of Steward's *culture core* since they are "most closely related to subsistence activities and economic arrangements" (Steward, 1955: 37). The asymmetrical aspects revealed in comparison seem to cohere with the *outer core* or 'cultural-historical' features, which include religious beliefs, irrigation management based on local logic and cosmology, plus self-portrayal as either heroes or victims in local narratives.

Comparison of these two cases also reveals that some cultural features and environmental conditions are concomitant. Although the villagers in each place have perceived changes in their cryo-hydrology, drought and desiccation were already understood as familiar phenomena in both places. Stories about past scarcity and people's ability to survive and adapt to drought fill the cultural memories of Mustangis and Colqueños. Water scarcity is a risk that dryland meltwater irrigators expect and are equipped to survive through their environmental knowledge and agro-pastoral practices. As Trawick (2001) states, dryland

irrigators have a profound ‘incentive to conserve’ in an arid environment marked by water scarcity because people have a *need* to “make the best out of [a] bad situation” (18). Although Steward’s ideas of cultural ecology have been heavily criticized as too deterministic, the regularities that I have presented are impossible to ignore. My findings are compelling evidence for a common cultural condition between Mustangis and Colqueños based on their dependence on meltwater irrigation. The same realization was made by John Hitchcock’s studies of cultural ecology in the Himalayas, where he concluded that different cultural, linguistic groups, or tribes in similar “ecozones” have more in common than culturally similar groups in different places (Mikesell, 2002).

In the dire context of a global ‘melt-down’ scenario, we should pay closer attention to the *core* necessities and common experience of mountain agro-pastoralists without overlooking their outward differences. Global change can be better understood by studying its impact on those local and sometimes marginal communities with the longest experience on the land who have the cultural resources and traditional knowledge which has sustained them through the centuries.

Abbreviations and Acronyms

ACAP -	Annapurna Conservation Area Project
CAMC -	Conservation Area Management Committee
DAO -	District Agriculture Office
DDC -	District Development Committee
DTO -	District Technical Office
FONCODES -	Social Cooperative Development Fund (Fondo de Cooperación para el Desarrollo Social)
masl -	meters above sea level
NGO -	Non-Governmental Organization
SENAMI -	National Meteorological Information Service (Servicio Nacional de Información Meteorológica)
VDC -	Village Development Committee

Glossary of Terms

T. = Tibetan

N. = Nepali

chu – (T.) water

chuli – (T.) apricot (tree)

chakam – (T.) peach (tree)

chalong – (T.) alternate spelling: ‘jyalong’; the Demoiselle Crane (*Anthropoides virgo*), a seasonal migrant bird in the Kali Gandaki region said by locals of Lumbuk Canyon to bring a “gift” of precipitation on its through-flight

changma - (T.) willow (*Salix spp.*)

chiyak – (T.) naked barley (as described by the Jomsom DAO)

churi – (T.) described as literally “water-time”; the irrigation time allotment corresponding to the amount of one *tungba* or area of irrigated fields that a villager owns; 1 *tungba* = 12 hours *churi*

dajang – (T.) compound word: spring-time festival with *da*, an archery target game played by the men, where everyone drinks *chang*, fermented barley beer

dzo – (T.) yak-cow hybrid

Guru Rinpoche – (T.) (also called *Padmasambhava*) *Nyingmapa* Tibetan Buddhist saint, said to have brought Buddhism to Tibet

kalatooah – (T.?, Sanskrit?) (also referred to as *kala-guti-lokti* and *kala-tuktu*) the ‘bad age’; a mythical, end-of-days period where the order and sanctity of the world is overcome by accelerating disorder and maladies in general. Such ills are evident in everything from people’s behavior to unusual climatic fluctuations (possibly related to the Hindu concept ‘kali yuga’ or the Tantric Buddhist concept of ‘kalachakra’, where *kala* is ‘time’)

kar – (T.) winter to spring barley and wheat growing season

kiapre – (T.) buckwheat

lalpurja – (N.) a testimonial document with red seal for land ownership (Source: Gautam’s Concise Nepali-English Dictionary); I understood this to refer to a ‘deed’ during fieldwork.

lama – (T.) Tibetan Buddhist monk

lengyi – (T.) communal labor group

lha – (T.) a god; or a mountain pass

lhu – (T.) the serpent god inhabiting sacred *shukpa* (juniper trees) and spring water sources

lungba – (T.) canyon or river

mepta – (T.) communal labor group

nak – (T.) the late spring to summer buckwheat growing season

neh – (T.) barley

ngimu churi – (T.) daytime *churi* or water-time where 1 *tungba* = 6 hours *churi*; the irrigation time allotment that works during periods of high stream discharge

rongba – (T.) an informal, slang word referring to Nepali lowlanders, sometimes understood to have derogatory or insulting connotations

shiao – (T.) apple (tree)

shukpa – (T.) sacred juniper tree (*Juniperus spp.*)

shyapten – (T.) ritual prayer ceremony led by a *lama*

tungba – (T.) a unit of land within a village as measured by the 12 hours of *churi* (water-time) during low stream discharge or 6 hours during high discharge; divisible from halves to eighths

torma – (T.) an offering cake made by *lamas*

tsemu churi – (T.) nighttime *churi* or water-time 1 *tungba* = 12 hours *churi*; the irrigation time allotment made as an adjustment to low stream discharge

tsingu – (T.) irrigation reservoir

yura – (T.) irrigation canal



Sp. = Spanish
Q. = Quechua

acequia – (Sp. Arabic *al-sāqiya*) irrigation ditch

anansaya – (Q.) “upper moiety” or “upper division”; part of a dual spatial and social ordering concept of the Incas, also used divide agricultural fields and their irrigation order; complementary of *urinsaya*

ancestros – (Sp.) ancestors, oftentimes referring to the original indigenous inhabitants of the Colca Valley

anticuado – (Sp.) antiquated; used to refer to locally available building materials, such as *adobes*, stones; used in the phrase “antiquated age” to refer to the relatively poor and undeveloped conditions in which people in the Colca Valley live

apu – (Q., see also *cabildo* and *orqo*) gods associated with high peaks and volcanoes in Incan and pre-Incan cosmology

ayllu – (Q.) “corporate social unit based on the kindred” (Paerregaard, 1997: 254) where “the autonomous unit of production and reproduction is a group of related individuals and couples who exchange labor and cooperate in the management of land and herds... [T]he well-being of a couple [in an *ayllu*] is proportional to the size and holdings of their collective” (Moseley, 1992: 49).

ayni – (Q.) exchange labor or mutual help

cabildo – (Sp.) a body of ruling officials; also used to refer to the mountain gods of pre-Hispanic cosmology (see also *apu* and *orqo*)

campesino – (Sp.) “‘peasants’, a self-designation of many rural people in the Andes” (Paerregaard, 1997: 255)

campiña – (Sp.) the irrigated agricultural land of a village or settlement

canal – (Sp.) irrigation channel or canal

ceqe – (Q.) ‘lines’; 41 of these radiated from the temple of the sun in Cuzco to sacred sites around the capital, where people went to worship. These were divided into four main groups based on the quadripartite *suyu* organization scheme, and then again into the dual *saya* structure, which consists of *anansaya*, the “upper moiety”, and *urinsaya*, the “lower moiety”

chacra – (Q.) agricultural field

cofradía – (Sp.) a “lay fraternity” or congregation of devotees with competent authority to exercise religious ceremonies or rituals (Catholic) (source: Diccionario de la Lengua Española, 22^a ed., <http://buscon.rae.es/draeI/>, translated by author)

criollo – (Sp.) “Spanish-speaking mestizo population inhabiting [the] coastal region” of Perú (Paerregaard, 1997: 256)

estanque – (Sp., see also *reservorio*) irrigation reservoir

faena – (Sp.) comunal labor group

fiesta – (Sp.) feast day or party

gringo – (Sp.) in all of Latin America, except Mexico, any light-skinned person; in Mexico, derogatory slang referring to North Americans

huaca – (Q.) a sacred site or object, usually associated with water sources or other features in the landscape; also before the Extirpation of Idolatries, the ancestor mummies which people worshiped and brought to a special temple in Cuzco

material noble – (Sp.) literally “noble material”, positively connoting modern building materials (such as cement, rebar, cinder blocks, bricks and corrugated metal sheets) which are considered superior to locally available building materials, referred to as “antiquated”

mestizo – (Sp.) literally “mixed”, but referring to somebody of ‘mixed blood’ or ‘mixed race’; mestizos can be either peasants, but the term is used principally to refer to city-dwelling people who have abandoned traditional, indigenous ways of life, like farming

nevado – (Sp.) a snow-capped mountain

orqo – (Sp.) a mountain god from the original, pre-Hispanic Andean cosmology (also *apu* and *cabildo*)

pago – (Sp.) literally “payment”; a ritual offering to *Pachamama* (Mother Earth) and *huacas* with coca leaves in Andean folk religious traditions; performed during irrigation related activities like the canal cleaning

purmaketke – (Q.) permanente mountain snow

regidor – (Q.) or *regidor de aguas*, literally “distributer of waters”; the distributer of water along an irrigation canal; the person in charge of managing water in Tapay’s decentralized irrigation management system; also the name for the water manager of the *de canto* state management system

reservorio – (Sp., see also *estanque*) irrigation reservoir

rústico – (Sp.) rustic; descriptor of locally available building materials, as well as irrigation canals and other infrastructure built with locally available materials; has negative connotations

- urinsaya – (Sp.) “lower moiety” or “lower division”; part of a dual spatial and social ordering concept of the Incas, also used divide agricultural fields and their irrigation order; complementary of *anansaya*
- yaku alcalde – (Q., Sp.) “water manager” responsible for the traditional ritualized irrigation practices of the centralized management system of Cabanaconde; one *yaku alcalde* is responsible for each of the sections of the irrigated area divided by *anansaya* and *urinsaya*
- zanja – (Sp.) small channels built at meltwater sources at the snowline to increment the streamflow of the local irrigation streams



Appendix A: Mustang Multiple Response Tables

Respondents commonly cited more than one reason for or solution to change in their water resources. The following tables show the total number of responses for a given category as well as multiple responses of each individual informant for the reasons, available solutions, and future solutions for change.

Respondent Number	Reasons for Changes							Total Individual Responses
	Does Not Know	Natural Fluctuations	Climatic Changes	Supernatural Causes	Water Sharing	Ecological Changes & Disturbances	Air Pollution & Global Warming	
1				X				1
2	X		X					2
3			X	X	X	X		4
4			X	X			X	3
5						X	X	2
6		X						1
7	X	X		X	X			4
8	X							1
9						X	X	2
10			X	X				2
11		X						1
12			X		X			2
13			X	X		X		3
14				X				1
15	X			X				2
16			X					1
17			X					1
18		X						1
19				X				1
20				X				1
21		X		X				2
22				X				1
23				X				1
24	X							1
25	X		X					2
26				X				1
27		X	X	X				3
28				X		X		2
29			X					1
30				X				1
Category Total	6	6	11	17	3	5	3	51
%	12 %	12 %	21 %	33 %	6 %	10 %	6 %	100 %

Respondent Number	Available Solutions								Total Individual Responses
	Prayers & Ritual	No Solution	Adapt	Collective Action	Aid	Agricultural Intensification	Technical Solutions & Innovation	Ban Pollution	
1	X	X							2
2			X		X				2
3	X			X			X		3
4	X								1
5		X				X	X	X	4
6	X								1
7	X								1
8	X	X							2
9							X		1
10	X								1
11	X						X		2
12	X	X							2
13	X								1
14	X			X					2
15	X						X		2
16				X			X		2
17		X							1
18	X	X			X				3
19				X	X		X		3
20	X			X					2
21	X								1
22	X			X					2
23	X								1
24	X								1
25	X	X							2
26				X	X				2
27					X		X		2
28	X	X							2
29							X		1
30	X	X		X			X		4
Category Total	21	9	1	8	5	1	10	1	56
%	37 %	16 %	2 %	14 %	9 %	2 %	18 %	2 %	100 %

Respondent Number	Future Solutions							Total Individual Responses
	Prayers & Ritual	No Solution	Migration	Adapt	Collective Action	Aid	Technical Solutions & Innovation	
1		X						1
2		X						1
3	X		X	X				3
4						X	X	2
5			X					1
6	X		X					2
7			X					1
8			X					1
9			X				X	2
10			X	X				2
11		X						1
12		X						1
13				X				1
14			X					1
15			X	X			X	3
16							X	1
17		X						1
18						X	X	2
19						X		1
20			X	X				2
21	X					X		2
22			X				X	2
23	X			X				2
24	X	X						2
25		X			X			2
26							X	1
27	X						X	2
28		X					X	2
29				X				1
30	X						X	2
Category Total	7	8	11	7	1	4	10	48
%	14.5%	17 %	23 %	14.5%	2 %	8 %	21 %	100 %

Appendix B: The *Emic* Bio-indicators of Lumbuk Canyon

A key informant of mine from Dhakarjhong named Ongjuk gave the only response connecting the changes in climate with local fauna. He explained that the reason for changing climatic patterns in the Lumbuk area might be due to the fact that two migratory bird species, a cuckoo (*Cuculus spp.*)⁸², and a crane (*Anthropoides spp.* or *Grus spp.*)⁸³, were no longer bringing their ‘gifts’ of rain and snow in their respective migratory seasons.

The cuckoo, locally called *cha khopyuk geyu*, or ‘the king of birds’ arrives to the Kali Gandaki Gorge in early spring when the *neh* (barley) and *chiyak* (naked barley) crops are still immature. It was explained that the rain ‘gift’ the bird brings speeds up their growth. It stays all the way through the *neh/chiyak* harvest and through the *nak* or summer growing season, and finally departs in early fall when *neh* and *chiyak* are again being planted. A local rhyme is recited about *cha khopyuk geyu*, who addresses the *neh* and *chiyak* he saw being planted before leaving for the winter, which still haven’t grown since he left:

Harbingers of Change: The Avian Indicators of Lumbuk Canyon Area

The Himalayan cuckoo (represented by one of its sub-species) is one of the possible species referred to as *cha khopyuk geyu* in the Lumbuk Canyon area, while Demoiselle crane is one of several possible species locally called *chalong* that stops-over in the area on its seasonal southward migration.



Oriental (Himalayan) cuckoo (*Cuculus spp.*)



Demoiselle crane (*Anthropoides virgo*)

⁸² The likely cuckoo species candidates are either the Eurasian cuckoo (*Cuculus canorus*), Himalayan cuckoo (*Cuculus saturatus*), or Indian cuckoo (*Cuculus micropterus*) (Sources: (Kothari 1998); (ICIMOD and IUCN-Nepal 2008)).

Koo-poo, koo-poo!

I've been to the thirteen boundaries of Tibet

And have even travelled all the way to the mines of salt,

But you're still not grown up!

Koo-poo, koo-poo!

(Translated from Tibetan by Rinzin Namgyal, edited by author)

Locals call the crane species that migrates through the Kali Gandaki canyon *chalong*⁸⁴. It arrives from Tibet flying southwards during the *kar* season harvest in early fall, just as *chakhopyuk geyu* is leaving. According to my informants, when *chalong* flies through, they know that rain or even snow isn't very far behind.

These responses exemplify beautifully how the Lumbuk peoples have *become* attuned to the patterns of their natural environment and how this knowledge allows them to register wider environmental and ecological changes through the observation of area flora and fauna. With their environmental knowledge and awareness of ecological cycles, these peoples use these extraordinary local indexes and a myriad of others to chart environmental changes.

⁸³ The crane is possibly the Demoiselle crane (*Anthropoides virgo*), Common or Eurasian crane (*Grus grus*) or the critically endangered Siberian Crane (*Grus leucogeranus*), due to their migratory flight paths over the Himalayas to overwintering grounds in the Indian subcontinent (Source: International Crane Foundation 2006).

⁸⁴ An alternate pronunciation of *chalong* in the area is *jyalong*.

Appendix C: Guru Rimboche and the Creation of Dhakarjhong

As told by Dawa Gurung (69), Dhakarjhong, Mustang, translated by Rinzin Namgyal, edited by the author

“In the ancient time, this place was occupied by the land god, sea serpent, ghosts and other spirits. The place was dangerous and frightening. All the gods and ghosts were very dangerous to living beings. Then the god Guru Rimboche came and foretold the future. He said: “There will be two places: ‘Dang’⁸⁵ and ‘Dhak’⁸⁶. Dhakarjhong was the best place for people to live though, so Guru Rimboche blessed the land with big trees and greenery, making it a land of wealth.

“One day, Guru Rimboche saw one male and one female ghost-spirit rush toward Lumbuk, so he picked up a *dorje*⁸⁷ and followed them. Halfway to Lumbuk, he saw them and spied on them. They were on a hill gazing skyward and looking around. He decided to kill them for the safety of humankind, so he flung the *dorje* at them. One ghost was cut in half and the other was crushed into the mountain. Their bodies turned into large boulders and can still be seen there today.

“He went back to Dhakarjhong and made the soil, placed rocks around and made the place suitable for human beings. And when he left, he established female and male gods as his body. Then Dhakarjhong became a human settlement.”

⁸⁵ (Tib.) ‘Beam-of-light place’ or ‘rainbow place’

⁸⁶ (Tib.) ‘Rocky place’

⁸⁷ (Tib.) A religious instrument in the form of a short metal scepter representing a thunderbolt or diamond, symbolizing the power and strength of each

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