Contemporary Tibetan Cosmology of Climate Change

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Tibetan Cosmology of Climate Change

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ABSTRACT

Open ended interviews with over 50 Tibetan experts on contemporary Tibetan cosmology of climate change reveals a breadth of interpretation of and belief about developing climatic conditions in the eastern Himalayas and in Lhasa. We group these interpretations into Buddhist, pre-Buddhist/shamanistic, and modern scientific/materialistic constructions. These categories overlap and combine broadly with individual interpretations, to the point where neither Buddhists nor scientific scholars would recognize their disciplines. Nonetheless, generally, there are beliefs that climate is changing and that bad deeds have caused this and good deeds will mitigate it (Buddhist), fickle gods must be supplicated and appeased (shamanist), or there are material causes and solutions (scientific/materialistic). As in our previous quantitative study on perceptions of climate change (Byg and Salick 2009), Tibetans widely agreed that climate change is happening: temperatures are rising, mountain glaciers and snows are melting, tree and shrub lines are advancing, rains are more variable, and that agriculture and health is suffering. In the extreme, some Tibetans feel that their traditional culture – food, clothing, livelihoods – is no longer adaptive and that, along with their political woes, Tibetan culture is also doomed by climate change.

INTRODUCTION

Indigenous and tradional peoples are often on the frontline of climate change (Salick and Byg 2007, Salick and Ross 2009) in that their subsistence strategies and livelihoods depend intimately on the environment and based on hundreds, even thousands, of years of empirical knowledge. It is important not only to understand the effects of climate change on these people – often without a voice – but also how they perceive climate change and their interpretations and beliefs about climate change. Otherwise we will never understand their plight, what's less their responses or their fears, and we will never be able to craft culturally and globally relevant responses. Most universally, we have much to learn from Indigenous Knowledge and Traditional Ecological Knowledge including alternative world views.

To this end, previously we reported on climate change (Salick, Fang and Byg 2009) and Tibetan perceptions of climate change (Byg and Salick 2009) in NW Yunnan, China. Now, we attempt to understand Tibetan cosmology in relation to climate change and to document the complex and dynamic nature of Tibetan cosmology. How do Tibetans observe climatic phenomena and what do they perceive to be the causes and the consequences of weather in their life? Furthermore, what are the complementarities and differences between modern science and Tibetans' cosmological system with respect to

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climate change. Such an exploration of the relationship between Tibetan cosmology and climate change can be a lens through which we examine how communities seek self-knowledge, understand the significance of their lives, and mediate their relationships with the environment.

Elucidating Tibetans' beliefs and knowledge about climate change is valuable on several levels. The high altitude environments in which they live are harbingers of the kind of ecological and cultural disturbances that will eventually impact other regions of the world. Critically, we have insufficient knowledge of the impacts that changes in climate will have on physical and ecological processes and lack historical baseline data (c.f., Salick, Fang and Byg 2009). Local observations recorded by resource dependent people can significantly reduce the uncertainty of climate change predictions and models. Since indigenous knowledge is place, time and culture specific, it can contribute to fill in gaps in terms of linking its micro-scale observations to the macro-scale frames of climate change research. In light of this local specificity, indigenous people's observations and meteorological records can test the confidence in downscaled models, especially where competing predictions are proposed.

Local environmental knowledge provides observations and interpretations at smaller geographical scales where systematic meteorological records are often scarce and predictions of climate change and its impacts are most uncertain. Tibetans are in the position to gather environmental information (including climatic) over larger areas and with much finer spatial resolution than weather stations which only register point occurrences. Some of the changes documented by Tibetans can not be covered by instrumental measurements or downscaled predictions. An assessment of change starting with land users' perceptions may reveal parameters salient to understanding local climate change but which are either ignored by or inaccessible to standard climatological analyses (Salick and Byg 2007, Byg and Salick 2009, Marin 2010). Local resource users observe climatic changes and their biophysical impacts at smaller spatial scales and in greater detail and can provide further evidence for or against general models and predictions made at coarser scales. Integrative approaches can lead to more robust predictions of mechanisms of change. As such, indigenous observations of local ecosystem changes may be used to validate model simulations and thereby increase our confidence in future climate projections as well as providing information for historical climate reconstructions.

As with other kinds of indigenous knowledge, information gleaned from Tibetan cosmology can be a rich source of information about local level ecosystem changes over a temporal scale of several generations. Indigenous knowledge includes collective memory of weather patterns that extends into the past and evidence suggests the presence of mental modes of normality in terms of weather against which a current situation is assessed. Understanding the historical patterns that communities have observed can help us to establish a basic framework against which variability and change are analyzed. By nature of its accumulation and transmission across generations, indigenous knowledge about climate can provide a longer time perspective and possibly a more accurate description of normal variability against which changes can be assessed (Marin 2010).

By observing variables and processes that may not be investigated by formal science, indigenous knowledge about climate change may reveal new significant parameters and phenomena, against which models can be falsified and readjusted. They can also expose subtle qualitative changes in variables otherwise ignored but with potentially great biophysical and socio-economic impacts. Moreover, indigenous observations of climate change have the potential to fill gaps in broader scale data and can also serve to inform culturally appropriate adaptation strategies (Green et al. 2010). Through participatory programs that are guided by indigenous methods of knowledge recording, local observations of seasonal cycles – and changes in those cycles – can be appropriately archived for the benefit of the community and cultural maintenance.

Tibetan Cosmology

> *"Human beings are simultaneously constituted as organisms within systems of ecological relations and as persons within systems of social relations."*
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> --Tim Ingold (2000: 3)

Cosmology is what a group believes about itself: what controls its life, the position of individuals in society and within the environment, and the interrelations of these aspects. Cosmological beliefs are the result of cumulative experience and observation, tested in the context of everyday life, and devolved by oral communication and repetitive engagement as well as through formal instruction such as religious teachings. In the present case, we will examine Tibetans beliefs with respect to what controls the climate, the roles and duties of individuals in relation to weather patterns, and the interrelationships between beliefs and action as they relate to environmental phenomena. Some accounts of Tibet tend to compartmentalize its religious life into discrete categories such as Tibetan Buddhism and so-called 'folk religions' such as animism and shamanism (Huber and Pedersen 1997). This tends to oversimplify a historical process characterized by a high degree of syncretism. The syncretism of Buddhism and shamanism is not problematic to Tibetan Buddhists. According to Samuel (1993), for Tibetans, the universe in which they live is seen as capable of multiple interpretations, which are not necessarily exclusive. Rationality is not, as it tends to be in contemporary western society, the single dominant mode of legitimate discourse. The common feature of all these influences is the belief that the phenomenal world is inhabited by a spirit powers and deities who are organized into a single "ritual cosmos" (Samuel 1993: 157). These deities, in turn, must be ritually acknowledged in relation to most areas of human activity. In explaining the differences between these influences in Tibetans' lives, Huber and Pedersen (1997: 584) write, "The variation between, for instance, the textualized Tibetan Buddhist approach and that found in the traditional local cults is mainly a difference of ritual strategies and orientations as well as officiants. The former approach (as one would expect of a universal religion) tends to emphasize soteriological concerns – karma, cyclic existence (samsara) and its termination in nirvana – while the latter is more interested in mundane

and pragmatic issues (fertility, fecundity, health, longevity and success). Yet there is no clear distinction between these tendencies for Tibetans in practice."

On the ground, the local perspective is primarily concerned with respect for the gods of the world. Specifically, Tibetans' cosmological concerns about nature are predominantly focused upon 'landscape gods' (*yul-lha*), 'local deities' (*gzhi-bdag*), 'lords of the soil' (*sa-bdag*), 'subterranean or water serpents' (*klu*), and others believed to inhabit mountains, passes, cliffs, rivers, and lakes within the vicinity of the village community, nomad camp, hunting ground or travel route (Huber and Pedersen 1997, Huber 1999). Tibetans believe that they are born into, and must continually cultivate, binding relationships between their communities and non-human occupants of the same localities; these relationships are conceived of in moral terms and entail mutual obligations. The cosmology of Tibetans cannot be adequately understood as institutional religion or as exclusively sociological phenomena. Place gods can also be seen as part of the historical process of groups acquiring political control over territories; in this sense, the gods are 'created.' Quite often these entities ('lords of place' – *sa bdag, gzhi bdag*) explicitly undergo an ontological change and are thereafter referred to as *yul lha*, 'territorial gods.' (Ramble 1996: 142)

Religious life manifests a complex community matrix, nurtured by the ongoing narration of myths transmitted by elders and ritually recreated in relation to the revelatory landscape. These practices should be seen as living in the sense that there is a continual construction of space, an ongoing process of negotiation between human communities, the landscape, and their deities. The powers that constitute nature include unpredictable beings that may be benevolent, neutral and/or actively malevolent. Deities may punish taboo violations through the use of storms and other weather anomalies. From the human point of view, then, maintaining this relationship requires correct, regular offerings to ensure a stable environment which yields its bounty. As Ramble (1996: 152) argues, "A divine population enlarges the scope for communication with the territory that it represents. There is unquestionably something more logical in trying to achieve the safety or fertility of an area by enlisting the help of an indigenous population of supernatural entities than in appealing to a lifeless landscape."

Tibetan Buddhism incorporated autochthonous deities into its pantheon and practices, creating hybrid mechanisms that mediate the relationship of people to their landscape. Features of the landscape and the landscape itself are thus understood as active beings whose needs and wishes must be respected. Individual gods or classes of divinities are often attributed with distinctive traits: the kinds of benefits they bring, the type of harm they can be expected to inflict (frequently diagnostic of their presence, and the measures that must be taken to appease or remove them; Ramble 1996). Many Tibetan practices highlight this understanding of the sacred or spiritual aspects of the landscape including the identification of particular places in the landscape as being inhabited by deities. Natural places, in turn, are sanctify by conducting pilgrimages through the landscape and by associating them with important historical religious figures (Ramble 199x, Huber 1999). Sacred geographical features are organized hierarchically, as in the concentric rings of a mandala, such that a sacred tree may reside in a sacred grove on a sacred

mountain ad infinitum (Lhalungpa 1990). Areas of particular significance for the Tibetan cosmology are typically delimited in several ways: via ritual, such as incense burning, flying prayer flags, circumambulation, or pronouncement of living Buddha; via structures, such as temples, monasteries, mani piles and walls, stupas, and prayer wheels; and/or via restrictions on human use, such as limitations or prohibitions on hunting and logging. The *ri-vgag* ('door of a mountain') is physically manifested as a contour line, above which is an entirely sacred realm and below which is a secular realm in which, nonetheless, there are sacred areas and sites (Guo 2000, Litzinger 2004, Anderson et al. 2005). Locating the sacred and the supra-human in definite places, villagers place themselves in explicit and tangible relation to forces beyond themselves on which their lives depend. They establish and acknowledge a cycle of interdependence and reciprocity that includes humans, plants and animals, and the larger forces beyond their control. While unable to control these forces, the villagers recognize that they do influence these forces by their behavior and attitudes.

Tibetans' syncretic cosmology is a function of an ongoing historical process, in which different kinds of worlds are at stake. The basic historical scenario is that from the eighth century to the present, Buddhism has been repeatedly encountering older beliefs. Recently, but often ignored as secular, modern scientific views are also encountered and incorporated. This encounter – along with the competing social visions that Buddhism, shamanism, and science – has been a singular factor in how Tibetan culture develops. In the shamanic cosmos, space is constituted by natural agents, and is local insofar as it is characterized by a vertical axis extending between the underworld and the heavens rather than expanding horizontally outwards. The vertical axis itself, rather than any particular god or class of supernatural beings inhabiting the landscape is linked to notions of fertility (Ramble 1996). Thus, changes in the climate are linked both physically and metaphysically with fertility of the land and, arguably, the viability of Tibetan communities. By contrast, Buddhist space is a globalizing vision of vastness, with a great horizontal array of alternative universes that is not at all limited to the local. The Buddhist cosmos is not particularized to a specific place or a god's unique name. Instead, it has repeatable space with universalizing categories of gods (Buddhas, Bodhisattvas, etc.). In sum, Buddhism features transregional, benevolent deities while the more ancient, shamanistic beliefs emphasize vengeful, irascible neighbor deities and demons. In contrast, science provides materialistic explanations and responses. Beyond clarifying these variegated strands within Tibetan cosmology, the chief relevance of these differences to our concerns here – climate change – lies in the cultural models that Tibetans have developed to explain and understand crisis and retribution in their lives.

In the ancient traditions of Tibet, yearly offerings in the form of animal sacrifices had to be given in order to afford protection of the spirits of the land rather than incur their angry retribution. These offerings were also adopted by Tibetan Buddhism, with the valence changed: killings were prohibited, and offerings took place in an expanded universe with new worlds, agents, and ideologies side by side (or top to bottom) with old ones. In the contemporary context, then, these two distinct matrices co-exist: (i) an older constellation of spirits (deities, demons, ghosts) and (ii) a newer Buddhist matrix of Buddhas and Bodhisattvas. Thus, an unfinished dialogue persists in Tibetan culture: the old pantheon of gods and demons is still there, stirring trouble and needing placation,

and. Tibetan Buddhism has not at all abandoned these beliefs but the place deities are now subordinated and displaced from the center. Instead of blood sacrifice, Buddhists employ tricks like spider web traps, effigies, etc. And, in addition, a whole new cosmos – of Buddhas, bodhisattvas, other worlds, etc. – now overshadows the older cosmos. With this overview of the historical process and factors that have shaped their complex and layered cosmology, it is now possible to consider how Tibetans conceive of a critical factor in their environment – the climate.

Contemporary science is available to some Tibetans through mass media, the internet, and oral communication that can evolve in the telling and often be individualistically interpreted and incorporated into Buddhist and shamanistic cosmologies. This is a notably overlooked phenomenon, yet almost universal.

METHODS

Conducting interviews about cosmology and climate change can elicit information about Tibetans' principles and the values with which they examine their communal lives and order the observed universe. With this in mind, we set out to complement our quantitative study on Tibetan perceptions of climate change (Byg and Salick 2009) and to more profoundly plumb the depths and breadth of contemporary Tibetan cosmology of climate change. We held in depth, open ended interviews ranging from hours to full days with a broad range of Tibetan experts – over 50 Tibetans in Tibetan China) representing many fields related to climate change: religious leaders (monks, living buddhas, scholars, etc.), Tibetan doctors, astrologers, calendar makers, historians, climatologists, botanists, agronomists, farmers, foresters, conservationists, tourist guides, Tibetan elders, and so forth. As an example of the depth of expertise, one of our interviewees documented that his family had been making Tibetan calendars for 1200 years. In the summers of 2007 and 2009, interviews were conducted in Tibetan NW Yunnan and in Lhasa; these interviews were held in triligual translation among Tibetan, Chinese, and English. The general line of questioning concerned perceptions of climate changes; causes, predictions, and sayings about climate changes; beliefs, gods, and ceremonies associated with the changes and with responses to the changes; the Tibetan calendar and changes; pollution, disease, morality, faith; conservation and mitigation; and government and international responses to climate change. We present these beliefs and cosmology in overview but also distinguish among varying and contrasting viewpoints.

RESULTS

Perceptions of climate change

Tibetans almost universally notice changes in climate, more often than not, in great detail. Our earlier study (Byg and Salick 2009) quantitatively analyzes this topic. However, there are comparable observations here as well:

1. General perceptions: Variation in climate is greater now and weather is becoming more extreme. Previously Tibetans could count on summer rains and winter snows but now there may be extended monsoons or droughts or winter melts or

abnormally heavy snows in any season. Some years irrigated fields do better and some years upland, dry fields produce more grain. Climate changes are sometimes positive and sometimes disastrous and very difficult to predict.

2. Temperatures: Almost everyone agrees that temperatures are rising although not uniformly every year. Some people think that warming is recent and others that it is a long-term trend. Different people attribute different consequences of the warming: more mice, more flies, more insect plagues, more human and crop disease, and more food spoilage. Many people attribute warming to human activities and others to spiritual causes presented below.
3. Glaciers and snow mountains: Again, universally Tibetans recognize glacial retreat and the decrease of snow cover on the Himalaya (and particularly Tibetan sacred mountains). These climate changes are of particular concern to Tibetans for a number of reasons, depending on peoples' orientations: religious people worry about the spiritual significance while materialists tend to blame Chinese tourists (see below).
4. Rain and Snow: After warming and glacial retreat, the next most common observation of climate change relates to precipitation, which is tremendously variable, unpredictable, and a big problem. A few people realize that the Himalaya supply water to more than a billion people in Asia, so that changes in precipitation and glacial melting have far reaching implications. Most people's concerns are more local. Sometimes there is too much rain at the wrong times and sometimes there is drought; rain falls in winter and snow comes in summer, while sacred snow covered mountains are becoming bare. Rains bring disease and weeds and drought brings insect and rat plagues, both causing poor crop yields and human tragedy.

   Landslides, avalanches, and floods also result from changes in rain and snow. People disagree about the extent of and changes in these. Landslides are often said to be more frequent although profligate Chinese road building adds to this trend. Floods are increasing downstream in both frequency and severity, resulting from both increased rainfall and melting snows and glaciers. However, one of the great Buddhist pre-historical climate changes (see below) tells of endless days and nights of rain, so some people say there is no contemporary comparison. Some say avalanches are more frequent with melting snows and others say less because of less snows.

   Rainbows are obviously related to precipitation and are charged with meaning in Tibet but their relation to climate change is equivocal. Rainbows appear when living Buddhas are born, bridging lives and the spiritual-material worlds. Rainbows represent fire, earth, wind and water and individual colors have associations and meaning. Sometimes rainbows are good fortune and sometimes not, but little change is noted.
5. Dreaded hail: Although the relationship with climate change is equivocal, few people neglected to mention hail or *bimbau*. It is considered evil and punishment because it devastates field and garden crops, nuts and fruit. There are many stories to back up this view. One man defecated near a sacred lake and was immediately killed by hail with his pants down. Another man found a burn victim in the mountains and cured him. It turned out that the cured victim was a human

manifestation of the sacred mountain. The following year when the mountain sent hail to the village, the fields of the man who cured the mountain were spared. Several people explained that sometimes just a single field is destroyed as punishment or a single field spared for good deeds. Inferentially, the connection between spiritual pollution and hail seems to extend to climate change, also often interpreted to come from spiritual pollution.

6. Wind: Similarly, wind is thought to be affected by people's deeds and pollution. Some people thought there was more severe winds recently including two extreme events when six mu (0.4 ha) of forest were completely uprooted and another when a large swath of trees were cracked off.
7. Sun, moon and stars: a few people thought that the sun might be getting closer to the earth, causing global warming. However, there was neither great consensus on how the sun, moon, and stars affect the earth nor in what realm: the material or spiritual. Nonetheless, Buddhist astrologers clearly use celestial bodies to form calendars and predict the weather, including climate change.
8. Seasons: traditionally there are 6 seasons in Tibet – early winter, late winter, early spring, late spring, summer, and autumn. However, now several people commented that seasons were less distinct or reliable and that only winter and summer were unambiguous. Even so, winter used to be the longest season, and now it is the shortest. Nevertheless, since livelihood activities are staggered, it becomes difficult to adapt to the changing seasons. Changing seasons also adversely affect health.

   Indicators are numerous: various birds indicate rain, yak cycles, seasons, etc; flowers indicate the changing seasons; and each star has its "duty". Many of these indicators are becoming disassociated from the seasons; even the Buddhist texts, which tell when to collect medicinal plants, no longer indicate appropriate seasons. As a result, people simultaneously are paying less attention to indicators and seem to be less familiar with them.
9. Tibetan calendar: Calendar makers and astrologers report that it is getting hard to keep up with climate change. Calendars are made with a combination of astrology and field experience both of which are indicating earlier and earlier seasons, warmer temperatures, and variable seasons. For example, every year three planting dates are prescribed in the Tibetan calendar; recently the earliest dates always produce the best yields. Calendar makers discussed vast consequences in Tibet of climate change including health, agriculture, and culture. Intriguingly, few other people mentioned culture, which the calendar makers elaborated: both traditional dress (warm) and diet (high fat, especially of yak butter and cheese) are now inappropriate for higher temperatures.

Causes of and beliefs about climate change

Remnants of pre-Buddhist shamanism flourish in beliefs about the water dragon "*Klu*" that controls precipitation and the air dragon "*Dhrö*" that makes lightening and thunder. Strict Buddhists are concerned about impure deeds (spiritual pollution) having caused climate change and the individually associated weather phenomena. In contrast, villagers

often blame tourists (Chinese) for pollution (especially defecation in sacred areas, washing feet in glacial lakes, and throwing garbage on glaciers); increased population (Chinese), electricity, and plastic bags and bottles are also held responsible for glacial retreat and loss of snow cover. These three perspectives on causation – Pre-Buddhist, Buddhist, and material interpretations – reappear continually in various permutations, forming the milieu of contemporary Tibetan cosmology of climate change and its components.

As an example of combined perspectives (see discussion), the avalanche on Mt. Khawa Karpo in the 1990s integrates these three cosmologies:

> Mt. Khawa Karpo, the physical manifestation of a warrior god (*Pre-Buddhist*) is one of the prominent unclimbed peaks in Tibet; since Khawa Karpo is a sacred mountain, Tibetans have a taboo on climbing it. However, a group of Japanese climbers, failing to get local permission, applied to the Chinese government, which gave them the need permit (*material*). As they climbed the sacred peak, a huge avalanche rumbled down the mountain, killing all the climbers (at which point in the story, the Tibetan raconteurs shrug knowingly). Their bodies were never found until the Japanese families arrived and preformed Buddhist prayers and ceremonies (*Buddhist*) to the god Khawa Karpo; soon afterwards the snows melted and the bodies were recovered and given proper burials (nods of affirmation). We were shown and offered for sale various pieces of climbing ropes and karabiners.

Attempting to distinguish the components of contemporary integrated Tibetan cosmology is somewhat more problematic:

1. Pre-Buddhist outlooks on climate change

Pre-Buddhist religion is populated by a pantheon of supposedly avenging gods, spirits, and animals/plants/physical features needing constant propitiation and portrayed in Tibetan Buddhist art as dark destroyers and devils. As in many supplanting religions, elements of former beliefs are either vilified or incorporated into Tibetan Buddhism; members of the Pre-Buddhist pantheon are won over to Buddhism including sacred mountains and popular home protectors – scary demons that keep out danger and intruders. People all over Tibet and Bhutan remain attached to Pre-Buddhist elements.

A Pre-Buddhist origin myth associates people, seasons and agriculture. Long ago there was the sun and the moon, but climate was changeable: sometimes it was hot, then cold, sometimes wet, then dry. When people arose, they could get food anytime and did not need to share. In the beginning, crops planted themselves but then people grew too numerous and food ran out. People could not grow crops because of the variable climate, so the weather was organized into seasons and people could cultivate and store grain. Seasons did not exist before people, but arose with agriculture, so that people could (or had to) plan ahead. Now seasons seem to be falling apart again.

Dragons, *Klu* and to a less extent *Dhrö*, are most commonly associated with weather and climate change. *Klu* (and its offspring, various frogs, fish, snakes, and mythical water

creatures) rules over all things wet and/or subterranean: water animals, wetlands, and precipitation; lightening and thunder emanates from *Dhrö* as it flies in the air. As precipitation becomes more variable and unpredictable, prayers and ceremonies to supplicate and propitiate *Klu* are now common. Whole villages (men only; women should not associate with *Klu*) mount to sacred lakes where *Klu* resides to perform secret and sacred rituals requesting more or less or appropriately timed rain. Women have their own sacred mountain, *Axhechachu*; if her snowy peaks should melt it would be very bad for women.

Another myth associates seasons with *Klu* (see Discussion): Once in the midst of a drought, an old poor man named Zhabulaniang went into the earth to ask *Klu* for rain. He found all the water animals toasting grain on a huge fire. Zhabulaniang says, "You are using too hot a fire that is drying up the earth and bringing disease and death. If you don't put out the fire, I will." So *Klu* made it rain, but it was too heavy, causing landslides and disease for crops, animals and people. So people asked Zhabulaniang to go back and reason with *Klu*. So *Klu* and Zhabulaniang decided to organize the seasons: rain would come in spring to green up pastures, then no rain when people began planting, then rain so that the crops can grow and animals would fatten, then no rain again during the harvest, then rain again for the pastures and for the eagle to go south, then snows begin to make hunting easier (tracking in the snow). *Klu* agreed to these seasons, but now they seem to be breaking down so people are praying again to *Klu*.

Primary elements are represented by mythic kings: *Chezheniqi*, King of Water; *Anizimazun*, King of Wind; King of the Earth and King of Fire. Tibetans also pray to the gods of sacred space and places to be less "worried in their hearts" about recent changes; sacred mountains, lakes, and trees seem particularly associated with weather events. There seems to be no traditional agent or protector for temperature, but then warming in Tibet is not always seen as a problem.

2. Buddhist outlooks on climate change

Tibetan Buddhism views climate as a combination of material and emotional forces. Mt. Shumi is the center of the material world around which the sun rotates, causing the seasons and temperature variations. Droughts, floods and landslides are also in the material world. Mountain gods, weather and people belong to the emotional world and are also related to climate change. Change is an integral part of both the material and emotional world, with past and future climate changes being vastly more drastic than anything we are now experiencing: for example, 1. the earth was transformed by a massive earthquake at which time life arose; 2. pre-historically, there was a great flood with unceasing rains that covered the earth; in the future 3. a vast fire, a conflagration will consume Mt. Shumi; and finally 4. a colossal wind storm will extinguish the universe. As a result, Tibetan Buddhists sometimes seem a bit blithe or at least philosophical about the present climate change crisis.

Nonetheless, Tibetans and especially farmers are very frustrated with the changing climate and turn to Buddhist monks, and living Buddhas to control the weather. One

living Buddha was getting fed up with recent constant supplication and told us a story: There was once an old monk who frequented a house where he begged for food. The woman of the house got fed up and dumped ashes on the poor old monk. A rich man who was visiting the woman when she dumped the ashes ended up marrying the woman. Other women started dumping ashes on the poor old monk too and the village got richer and richer until too many women dumped ashes on the monk and then it started raining flowers. Many different kinds and colors of beautiful flowers fell until the whole village was buried in flowers and everyone died. Moral: You should wait for good fortune, not ask for it, or good will turn into bad (e.g., too many people asked for rain and then too much rain fell, resulting in ruined crop harvests and floods).

Buddhists contemplate good deeds being rewarded and bad deeds being punished, often by weather or weather related disasters: droughts, floods, famines, storms, plagues, and of course, death. In the case of the Japanese climbers above, the bad deeds of climbing the mountain and lack of faith was punished by the avalanche, while the good deeds of prayer, ceremony, and faith by the families was rewarded by snow melt for recovery of bodies. Similarly, Chinese tourists are considered faithless, materialistic, and bad mannered, whose bad deeds generate changes in Mt Khawa Karpo and climate. On a larger scale, climate change is often related to bad deeds: spiritual and material pollution, lack of faith, external domination, cutting down trees; while mitigation of climate change is deliberated through good deeds: serving Buddha, praying, helping the needy, planting trees.

3. Material causes: Who or what is to blame?

During the Cultural Revolution and today in the media, material interpretations are encouraged. Many Tibetans ascribe material causes to climate change. People get their information from many sources: gossip, village meetings, NGOs, the internet, and some have even seen pirated, subtitled versions of Al Gore's video "An Inconvenient Truth". Even professional climatologists in Tibet resort to the internet to get information. At the time of this research, the central Chinese government was providing little official information on climate change and its causes. However, government policies and people's reactions to them do figure into beliefs on the material causes of climate change. Variation of opinions on causes of climate change is great with some recurring themes: material pollution, electricity, tree cutting, and Chinese population being the most common.

For many, it seems an open question, whether climate itself is changing (or whether, for example, perhaps the sun is getting closer) or whether human activities are merely warming up the surroundings (i.e., fire, electricity, roads, mining, housing, plastic, and people themselves all are thought to add heat to their surroundings). Cutting trees as a cause of climate change is mentioned both for spiritual and material reasons, although the scientific concept of carbon capture was *never* mentioned. With so little climate change information available in the media and from official sources, there is almost no recognition that warming is a global phenomenon with causes more distant than Tibet itself. In the Himalaya, rainfall is increasing significantly. Many people seem familiar

with the water cycle (taught in schools) and think that the vast oceans of the world are putting too much water in the atmosphere. Glacial retreat is thought to be impacted by recent intense government promotion of tourism and by the hotels and garbage generated. Defecation is always a big issue as both religious and material causes. Chinese migration into Tibet and Chinese tourism, both sponsored and subsidized by the central government, enlarges local population significantly, which is also thought to cause climate change.

Predicting and controlling weather

Recently, with climate change, increasing variability of weather, and peoples' uncertainty and vulnerability, Tibetans are especially interested in predicting weather. The first line of weather prediction is with the villagers themselves and their traditional knowledge; however, many people contradict one another. Stars, clouds, crops and various says help villagers predict weather. Some people say that if there are stars and a bright moon, then it will be clear the next day; others say the opposite. Fast moving clouds auger rain to some and drought to others. An oft quoted saying in Tibet is similar to the western mariners' jingle, "Red sky at night, sailors' delight; red sky in the morning, sailors' take warning", although Tibetans disagree which red sky predicts a storm and which sky clear weather. Other sayings pay attention to the direction of crow caws, to a noisy sky that never brings rain, to rainbows around the sun or mountains that predict fair weather, to frogs entering the house which bring rain, to swallows flying low indicating rain, and to cuckoos whose various antics forecast different weather. Some people are known to be particularly adept at predicting weather or supplicating local gods. These people claim to rely on their own experience and subtle fluctuations, but still readily admit to being caught out by surprise freezes and so forth. Tibetans often shrug and say, "difficult" or "watch television".

A more advanced line of weather prediction and intervention comes from monks in monasteries and especially from living Buddhas. They watch how water flows, they read texts (including Milarepa's book), they consult with Tibetan calendars and astronomy, and they pray and give offerings. Monks and living Buddhas claim to know in their heart about the future, including the weather, but they generally do not tell people; they can intervene but prefer not to (see above). Spirits can control weather and spiritualists can communicate with them to predict or change weather. People who want to control the weather particularly study shamanic beliefs.

Mitigation of climate change

For Tibetans there are two main ways to mitigate climate change: prayer/supplication and following the true path. Conversely, pollution, bad deeds, cutting trees, etc. will cause disaster often in the form of weather, avalanches, plagues, bad harvests, and so forth, all related to climate change. Monks, living Buddhas, and even environmental workers can intervene through good deeds, reading texts, prayer, ceremony, offerings, medicine, and so forth; but ultimately everyone must follow the true path and perform good deeds to

avoid disaster. Peoples' actions, intents, and behaviors create karma and climate change. If people are true and good then climate will stabilize. This is an immense moral burden.

Government and international responses to climate change

Many people voiced the need for the Chinese government to address climate change through policy and programs. Some government programs are thought to counteract climate change while others are thought to increase it. Tibetans feel that climate change is exacerbated by government policies discouraging Tibetan culture and religion and supporting Chinese migration, tourism, xenophobia and hegemony. On the other hand, climate change is thought to be potentially mitigated by government policies against deforestation and logging and in support of conservation, reforestation, alternative energy, and "Cleaning the Villages". However, in general, Tibetans are reluctant to openly discuss government policy.

In Tibet, little is known about international causes and affects of or responses to climate change. Those who have information are confused by both the Chinese governments silence and the lack of international political will. They encourage us to DO something.

DISCUSSION AND CONCLUSIONS

Interpreting interview data – what do Tibetans notice about the climate?

The phenomena discussed by the Tibetans we interviewed are, for the most part, intrinsically but differentially noticeable. For example, the salience of snowfall, temperature, or a retreating glacier makes these more easily observable than more subtle changes in plant populations. As a result, people are more likely to notice, especially over time, types of change that are more salient (Vedwan and Rhoades 2001). Perceptions of weather and weather fluctuations are tied closely to the material conditions being affected (Vedwan 2006). As noted above, the phenomena that farmers perceive are typically associated with outcomes that are particularly important to their livelihoods. Farmers reduce and order vast amounts of potential climatic information through the knowledge of relatively well-defined windows of performance-related parameters (Vedwan and Rhoades 2001). Not surprisingly, then, in our interviews informants were likely to notice climatic events associated with changes in their crops if they are farmers, spiritual changes if they are monks, temporal changes if they are calendar makers, and so forth.

A number of caveats should be noted concerning Tibetan views of climate change. First, Tibetans may have a different notion of time than that with which we are familiar. Climate change research is grounded in a linear conception of time. This temporal cast imposes future oriented ideas on informants who may not necessarily share this same orientation towards time. As such, research premised on linear and future-oriented conceptions of time may be inconsistent with the short-term or immediate concerns of Tibetans, whose temporal orientation prioritizes the concrete horizon of the present that can be manipulated and, to a certain extent, managed. This more immediate future differs from their distant and unknowable future that can only be influenced by spiritual forces

and thus outside human manipulation. At times, participants in this study redirected discussions concerning the long-term consequences of climate change to more immediate and pressing concerns they and their communities faced.

Tibetan Conceptions of Climate

Science represents global climate change as an ensemble of global, quantified interrelationships, whereas Tibetan cosmology represents climate as a system of local, qualitative interrelationships of humans and spirit powers. In contrast to western climate change research that focuses on ecological processes, the Tibetan experiences these processes as spiritual forces that animate the cosmos in regional-specific ways. The scientific view sees climate change as an external process that can be predicted, controlled, and even profited by; the Tibetan view, on the other hand, prioritizes an ethic of social responsibility towards an uncertain, animate, spiritual and responsive world.

Local knowledge and the perception of climate cannot be deduced from the empirical properties of the phenomenon in question alone. Perceptions of climate (Byg and Salick 2009) – although proximately structured by the salience of the phenomenon in question, as well as its impact on livelihoods – are a subset of the broader relationship between the Tibetans and their environment. The observations we present previously and here must be couched within a broader system of meaning and signification in which the perceptions are embedded (Vedwan 2006). It is critical to consider relational perceptions with other elements of the complex of human-environment interactions. Local views of climate change are not only the outcome of perception but arise from underlying epistemological and ontological premises, which we have discussed above. In our interviews, Tibetans repeatedly drew upon spiritual references in explaining climate change: the weather phenomena they observed were seen as physical manifestation of human relations with broader ecological, social, cultural and spiritual processes. Weather conditions are linked to social life and correlated with a code for proper conduct. Thus, the most salient feature of Tibetan understandings of the weather is the perceived relationship between the vicissitudes of the physical climate and those of the prevailing 'moral climate' created by human activities.

The relationship between the actions of humans and the environment is demonstrated by the creation of the seasons myth (see Results). The multi-valent perspectives on causation – shamanist, Buddhist, and materialist/scientific interpretations – appear continually in local narratives of climate change. The ways in which the diverse influences components of contemporary Tibetan cosmology are nested is illustrated by the Tibetan interpretation of the Japanese climbing permit (materialist), the avalanche off Mt. Khawa Karpo (shamanistic influence), and the recovery of the Japanese bodies (Buddhist influence – see Results).

Beliefs about the causes of climate change

In crisis situations – in this case, climate change – people reach for explanatory frameworks, and yet there is so much that is unknown and unknowable about being and

reality in the face of the intense human need for knowability and order. The search for reasons and sources is, in part, an attempt to figure out how crises can be resolved, possible infractions rectified, and offended agents appeased; and partially it is about a search for meaning, security, and order in the world, where the unexplained is explained, the chaotic and random is made orderly and predictable. In response, we create narratives for understanding this vast unknowable – narratives of God, discourses about local spirits, to name just a few. In every culture, we find these fundamental issues of crisis and response, yet we find quite different assumptions, values, and practices. At the level of the crisis there is tremendous similarity across cultures, yet at the level of diagnosis there is significant divergence and diversity.

In essence, a crisis is a breakdown in routine. A crisis is something relatively major that has immediacy about it, and a demand that we respond. Crises tend to occur at discrete moments, even if they are some time in forming, and they demand we respond without delay. A crisis interrupts, fragments, and tears open our lives: our seamless world is suddenly revealed to have seams, and they are falling apart. So much of our world is in the background, and usually we just take continuity, fluidity, etc. for granted. When a crisis happens, suddenly these background processes are revealed as contingent. In the immediacy of the crisis we realize that the maintenance of our world structure is the single most compelling and important thing in our being, even if we rarely give a thought to it when things are fine. To heal these rifts, we need arguments, narratives, and images to stitch the world together in a compelling fashion: these are the functions of a cosmology – a seam-stitching narrative. We can now ask a series of questions about these crisis points in Tibetan culture in relation to climate change. What is the diagnosis, i.e., what agents caused it? The crisis is usually clear – it is a manifest situation. But the reasons are generally far from clear, and it is here that different cultures have widely divergent frameworks for understanding the hidden forces at work behind the scenes.

To elucidate how cosmological beliefs affect Tibetans' perceptions of climate change, it is helpful to think through their models of crisis and retribution. In essence, retribution refers to how we understand the reasons why bad things (i.e., crises) happen to us as individuals, as collectives, as peoples. In the case of climate change, how do Tibetans diagnose the causes and consequences of this crisis? By examining the underlying ideologies of retribution, we can gain insight into Tibetan cultural understandings of climate change, and their sense of agency in the midst of this unfolding crisis. Are changing weather patterns a punishment brought on by the gods for pollution or the breaking of taboos? Is the melting of a glacier, and its concomitant effects on the availability of irrigation water and the productivity of crops, a reparation for sins committed in a past life? Do Tibetans feel they 'deserve' the effects of climate change? In this time of crisis, to what or whom are the Tibetans turning?

As we have discussed, Tibetan cosmology is a complex and nested process that has changed over time. A central paradox in the historical shift from a cosmology based in shamanic conceptions to Buddhist ideas is that the locus of power has been displaced from local to translocal. In the ancient beliefs, power was very local – deities were known by their names, they lived in particular places, and a body of situated narratives helped

account for problems as well as their solutions. In the shamanic cosmos, retributions came as punishing afflictions caused by disharmony in the matrix of human-deity relations. In this system, reciprocal exchanges of life for life (i.e., sacrifices) based on seasonal cycles had to be completed, the neglect of which was divine retribution. The guilt of having offended the primal owners of the earth living in the underworld, who had to be placated to gain abundance, was also linked to a sense of decline from former rules of reciprocity set by their forefathers.

But with the ascendance of Buddhism, Tibetans' cosmos has shifted out of the village social matrix, and power has been displaced into more transregional locations. In this milieu, it is harder in the midst of a community crisis to pinpoint from where harmful action has emanated, and what is its cause. From a communal model of retribution, a shift occurred in the explanation of suffering in the Buddhist retribution model, which instructs individuals to embark on a karmic career, accumulating merit and insight. This displacement – from local to translocal – reverberates in, and is amplified by, the global nature of the climate change crisis. A Tibetan may be forgiven for being confused about the causes of changing weather patterns, given the cosmological constructs he/she may have learned. A melting glacier may simultaneously be attributed to a local pre-Buddhist god forsaking a village, to bad deeds and spiritual neglect, and to plastic bags warming the environment.

At its foundation, Buddhism believes in universal respect for all life and emphasizes the ethics of doing no harm; Buddhists live in a world of ethical obligations, choices, and agents. Buddhists contemplate good deeds being rewarded and bad deeds being punished, often by weather or weather related disasters: droughts, floods, famines, storms, plagues, and of course, death. In the case of the Japanese climbers above, the bad deeds of climbing the mountain and lack of faith was punished by the avalanche, while the good deeds of prayer, ceremony, and faith by the families was rewarded by snow melting, allowing the recovery of the bodies. Similarly, Chinese tourists are considered faithless, materialistic, and bad mannered, whose bad deeds generate changes in Mt. Khawa Karpo and the climate. Glacial retreat is thought to be caused, in part, by recent intense government promotion of tourism and the associated garbage generated by the hotels and travelers. Defecation is always a big issue, with both religious and material consequences. Chinese migration into Tibet along with Chinese tourism, both sponsored and subsidized by the central government, enlarges local population significantly, which is also thought to contribute to changing weather patterns. On a larger scale, climate change is often related to bad deeds: spiritual and material pollution, lack of faith, external domination, cutting down trees; mitigation of climate change, meanwhile, is facilitated by good deeds: serving the Buddha, praying, helping the needy, planting trees, etc.

In examining Tibetan perceptions of the crises brought on by climate change – natural disasters, unpredictability in seasons and the productivity of crops, etc. – it is essential to understand the existential import of non-human spiritual agents and the seminal concept of karma – the chain reaction of causes and conditions (*rten 'brel*). Natural and cultural worlds are not dichotomous or even distinct entities but a single sphere subjected to the

workings of the same forces, whether sacred or secular. In the Tibetan context, then, rectifying the ill effects of climate change is seen as depending on the capacity to restore harmony with the natural world. For Tibetans, the degradation of the environment is caused by the disruption of way of life, including proliferating harmful practices, affecting both the natural and the social worlds.

The undercurrent of politics in these narratives of crisis is critical. The loss of autonomy is a recurring motif in which external cultural influences, the state's interventions in everyday life, and the subversion of community norms are all seen as being the cause as well as evidence of increasing disorder in the social and moral lives. The fear of loss of autonomy, in livelihood and social spheres, is driving Tibetans' concerns about uncertainty amidst the climate crisis, with a looming sense of retribution.

Limits to adaptation

> "Local knowledge and perceptions exist in dynamic tension with the various aspects of material and discursive reality encountered by the historically situated actors."
>
> -- Vedwan (2006: 8)

Research can help identify some of the negative effects brought on by climate change and may enable community members and organizations to formulate effective responses. Moreover, the kind of research presented here can explore the complexity of climate change in ways that can inform policy makers and elucidate its potential social consequences. Local people's knowledge about the climate is but one of the many factors which influence local actors' decisions on how and whether to prepare or act. Despite their knowledge and belief in the reliability of native indicators, many factors beyond their control limit the range of adaptive actions they can take. Changing climatic conditions can negatively affect the performance of many commons and the functioning of indigenous management institutions (Dominguez et al. 2010). In turn, poverty and deteriorating access to livelihoods and other resources strongly determine actors' capacities to take preventive measures against climate impacts and to reduce their vulnerability.

Non-climate factors such as poverty, inadequate resources, and lack of preparedness expose agro-pastoralists like the Tibetans we interviewed to climate impacts and limit their adaptive capacity. Both the International Panel on Climate Change and Arctic Climate Impact Assessment suggest that the global nature of climate change will eventually limit the effectiveness of traditional responses. On the other hand, we have and continue to documant traditional management that indicates great potential for adaptation to and mitigation of climate change (Salick et al. 2005, Salick et al. in prep.) Lacking reliable models of future climates at local level, perhaps the best we can do is to focus on the flexibility of local farming and livelihood systems in terms of adaptability to changing conditions of production (Adse et al 2010) and to learn about local climate change, adaption, and mitigation from local peoples (Salick and Byg 2007). A critical

question is whether Tibetan communities in the Himalaya will be capable of adapting to the climatic changes that will most certainly take place.

Conclusion

> If we have demanded that indigenous peoples suspend symbolic and imagistic modes of knowing so that they might enter into the western scientific and economic worldview, is it the case that we, seeking to understand something about indigenous experiences of the sacred, need to bracket exclusively analytical, rational, individualistic thought? Is there an indigenous episteme that knows empirical realties as wholes in ways other than through analytical knowledge of constituent parts?
>
> -- Grim (2001: 141)

Indigenous knowledge and climate change science can complement each other through different types of data collected, different scales of analyses, and the temporal scales at which both forms are generated (i.e., indigenous knowledge is continuous, while modern climate change analysis is based on discrete time units such as months, years, etc.; Speranza et al. 2010). As we have seen, indigenous communities like the Tibetans we interviewed, can provide observations, predictions, explanations and world views for climate change at scales and in contexts currently underrepresented in climate change research. Emphases on qualitative changes rather than on quantities may, furthermore, lead to a more meaningful analysis relevant to social-ecological systems. Indigenous knowledge, such as that recorded here, can provide information regarding local perceptions of what kind of changes truly matters (i.e., what locals identify as dangerous changes). We must attempt to understand emic perspectives even though science retains, if not clings to, its standing as the final arbiter of the validity of knowledge (Sillitoe 1998).

Researchers often engage indigenous knowledge to access information that can then be confirmed through western scientific methods. However, this knowledge may be codified and used by scientists and managers in a way that does not confront their own cultural conceptions. We may accept knowledge that can work with familiar Western categories and deny that which is problematic (Leduc 2006). Moreover, indigenous knowledge may be viewed through categories of utility and non-utility, largely confirming western assumptions and interpreted from a western economic rationality that is oriented toward scientific assessment without sharing potentially useful knowledge with knowledge holders. Such approaches downplay the variety of ways that individuals can draw on the shared stock of knowledge, a variety that enriches the extensive conversations about weather and climate.

Since non-environmental factors, to a large extent, drive the way actors adapt to climate change, the likelihood is that indigenous knowledge – and native frames of reference such as cosmology – will continue to be used mainly for monitoring. This is missing

greater opportunities. Additionally, continued widespread use of indigenous knowledge in monitoring is threatened by the limited transfer of this knowledge to the younger generation in Tibetan areas. Members of the younger generation may have difficulty acquiring such knowledge directly through their own long-term observation and direct experience because farming and herding are not likely to remain their main livelihood activities. Furthermore, as the global climate changes, plants and animals are expected to adapt to new ecological conditions, move, or go extinct. Thus, the future use of plants and animals – and local people's knowledge about them – may be limited, both for subsistence and for climate change monitoring. Still, indigenous knowledge about other climatic variables like temperature and wind direction as well as precipitation amounts and patterns can provide valuable information on climate change. These indicators require continuous monitoring as they also change. Traditional adaptations to and mitigations of climate change could provide even more salient and widely useful contributions to a disaster response.

Narrative recollections and memories about history, tradition, and life experience represent distinct and powerful bodies of local knowledge that have to be appreciated in their totality rather than fragmented into data, if we are to learn anything from them (Cruikshank 2005). Moreover, these forms of knowledge cannot be separated from social forms of organization, from subsistence practices and trade exchanges, or from imagistic and conceptual thought processes. As such, the decontextualization of indigenous knowledge, such as Tibetan cosmological notions and practices, cannot be separated from their original context without rendering them meaningless. This underscores the need to recognize that environmental management strategies, e.g., climate change mitigation, must be tailored to specific locations. This is particularly salient for designing adaptive strategies for climate change in inhabited lands.

The role of indigenous knowledge in sustainably managing ecosystems and natural resources has been internationally recognized for some time. Yet researchers have paid too little attention to the role of beliefs in the processes of change in the management of territory and communal natural resources (Dominguez et al. 2010). In Tibetan areas, as we reported, little is known about international causes and affects of or responses to climate change. Those who have information are confused by both the Chinese governments silence and the lack of international political will. But as we have learned, in the Tibetan context, peoples' actions, intents, and behaviors create consequences. Perhaps the most important thing that we can learn through an exploration of Tibetan cosmology in relation to climate change is not that increasing ecological knowledge will reveal a means for developing rational economic policies. Rather, engaging Indigenous Knowledge can broadening our own conceptions about how humans should live in relationships with the environment. This may be a first step in truly examining the role of culture and religion in facilitating a more sustainable society. Interpreting, as do the Tibetans, that climate change is the biosphere's response to improper human actions may provide a compelling and necessary antidote to our own assumptions; further, it may prompt a renewed engagement with, and questioning of, our own cultural and spiritual beliefs about the ways in which we interact with the environment, and the choices we are making in contributing to climate change.

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