Traditional Architecture in Tibet: Linking Issues of Environmental and Cultural Sustainability

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Personal Views

Global Warming—A Threat to Mount Everest?

During the last decade there has been a progressive increase in the number of alarms that link Mount Everest, or other glacierized mountain regions, with global warming. Statements have appeared in the news media, electronic communications, environmental and conservationist publications, and the scientific literature. So it is timely to assess the relevancy, accuracy, and effectiveness of this growing trend. I will, therefore, make several observations that may arouse a response from the readership.

It is generally accepted by the majority of scientists that world climate is warming; at least part of the cause is the release of 'greenhouse gases' into the atmosphere as a result of worldwide, but especially industrialized nation activity. One simplistic statement to be derived from this assumption is that warmer *local* climate (ie the climate of a specific glacierized region) will result in acceleration of the melt rates of snow and ice and a greater proportion of total precipitation in the form of rain as distinct from snow. Thus, if total precipitation remains unchanged (not necessarily a safe assumption) glacier mass balance will become negative, or more negative, and glacio-hydrological processes will respond.

One aspect of any discussion about global warming is the problem of differentiation between human-induced change and natural variation, or climatic fluctuation. A second is how this discussion is 'fed' to the news media and how, in turn, the media project such information to the public and to the decision-makers. The second aspect will be discussed here.

The most disturbing example of this transfer of knowledge and scientific opinion that has come to my attention is *Meltdown in the Himalayas* published in the highly respected journal *New Scientist*. The crux is Fred Pearce's quotation of John Reynolds to the effect that "… the 21st century could see hundreds of millions dead and billions of dollars in damage…" from the outbreak of glacial lakes—predominantly in the Andes and Himalaya (Pearce 2002). A parallel piece of melodramatic reporting appeared in *The Times* (21 July 2003) claiming that "… the glaciers of the region [Central Indian Himalaya] could be gone by 2035," credited to Professor

FIGURE 1 Imja Glacier showing the development of 'Imja Lake' up to 4 November 1991. At this stage the lake is 1.1 km in length, its lateral and end moraines are ice cored, and it is still enlarging. The lower glacier was photographed by Fritz Müller in 1956. At that time no lake existed, only a few small melt ponds on the surface of a moraine-covered glacier tongue. Location: in Sagarmatha (Mt Everest) National Park, immediately south of Island Peak and Mt Lhotse. (Photograph by K. Kawaguchi)

FIGURE 2 Jökulhlaup, southeast Iceland, 18 July 1954. This 'medium-sized' hlaup (outburst flood) has discharged from the southeastern terminus of the glacier Skeiðarárjökull. The floodwaters completely covered the sites of 2 formerly prosperous settlements, Eyrarhorn and Rauðilækur, and several other farms. Destruction of the farmlands and threats to the buildings of Skaftafell forced evacuation up the nearby hillslope in the 1830s. (Photograph by Jack D. Ives)

Syed Hasnain. Note the use of the conditional "could," in both statements. (These examples and others are discussed at greater length in my recent book, *Himalayan Perceptions: Environmental Change and the Well-being of Mountain Peoples.*)

I was hardly surprised, therefore, when I received a request from Peter Roderick, an English environmental lawyer, to join in an appeal to UNESCO by a group of distinguished environmentalists and mountaineers to "save Mount Everest from global warming." A petition was signed (not by me, though) and presented to UNESCO in Paris on 18 November 2004. UNESCO diplomatically chose to side-step the issue.

It would seem relevant, therefore, to ask: what is the threat that global warming poses to the Sagarmatha (Mt Everest) National Park and World Heritage site? First, it is worth pointing out that there is substantial baseline information to provide at least a partial answer. Erwin Schneider made extensive photo-theodolite surveys in the 1950s and 1960s. Fritz Müller (1959) undertook the first serious glaciological and permafrost research in 1956 although, regrettably, many of his photographs were lost after his untimely death. Then there was a succession of Japanese glaciological expeditions from the early 1970s until recently (Higuchi et al 1976 and 1980; Fushimi 1977; Fushimi et al 1985; Watanabe et al 1995). In 1984 Bradford Washburn and Barry Bishop coordinated the first high-quality vertical air photography that led to the publication of the National Geographic Society topographical map (1:50,000 1985). The response to the Dig Tsho jökulhlaup (Ives 1986; Vuichard and Zimmermann 1987) led to identification of a rapidly expanding lake on the Imja Glacier ['Imja Lake'] (Watanabe et al 1994).

These surveys demonstrated that there had been considerable glacier thinning and retreat since the first observations in the 1950s. It had also become apparent that there was a definite risk of catastrophic drainage of glacial lakes. Other contemporary observations (Hewitt 1982; Xu 1985) and reference to the literature led to the conclusion that the pattern of glacier lake formation in the Khumbu occurred over a much larger area of the Himalaya. In fact, this was seen as a widespread phenomenon in many of the world's mountain regions. Nevertheless, it was another decade following the catastrophic outburst of Dig Tsho in 1985 before the Nepalese government was moved to take any action. An inventory of glaciers and glacial lakes for the entire Nepal and Bhutan section of the Himalaya was undertaken as a joint ICIMOD/UNEP project (Mool et al 2001a,

2001b). The World Bank was also alerted to the threat that glacial lakes posed to projected hydroelectric infrastructure in the Arun Valley in eastern Nepal (see Ives 2004: 131–132; 207–209).

It was not until the 1990s that the general public of Nepal became aware of glacial lake dangers. Several lakes had burst, causing damage to infrastructure and some loss of life. However, the threat posed by the rapid growth of Tsho Rolpa in the Rolwaling Valley became a *cause célèbre* because it led to the evacuation of many settlements downstream of the lake. A great amount of work was undertaken to effect a degree of artificial drainage and so reduce the danger; and the lake did not discharge (Mool et al 2001a). It was the Rolwaling event that politicized the issue of glacial lake hazard; the question of why and how survey and construction contracts were awarded was hotly debated in the Kathmandu press. Of relevance is the recent highly critical review in this journal by Reynolds and Taylor (2004) of the ICIMOD/UNEP glacier and glacial lake inventories. While the 2 inventories have much to commend them and represent a vital beginning, I think that the criticism was justified; it likely could have been averted had ICIMOD responded appropriately to internal review of the original manuscripts.

The above-mentioned petition of 18 November 2004 to UNESCO indicated that the primary threat to both people and the environment was related to the melting of snow and glacier ice. Such melting was claimed to be causing rapid development of unstable lakes that could discharge suddenly, endangering "the lives of thousands of people and destroying the environment."

As noted above, it has been well documented that the Khumbu glaciers are thinning and retreating and that potentially hazardous glacial lakes are forming. At issue, however, is the degree of hazard, and this appears to have been grossly over-estimated. We must also ask how the occurrence of a natural event (ie jökulhlaup or glacial outburst floods) can be seen as "destroying the environment?" Jökulhlaup are known to have occurred in many glacierized mountain areas and have been documented in the Alps, Alaska, the Canadian Rockies, Karakoram, and Pamir, amongst others. In Iceland, where the actual term *jökulhlaup* originated, there is a reliable record of destruction of farms and villages extending over several hundred years. Thus, they are not specific to current global warming. So how can a natural process "destroy the environment?"

More significantly, what can anyone, or any institution, do to protect Mount Everest from global warming? The BBC News/South Asia (18 November 2004, online) cautioned that Mount Everest "could one day become nothing but rock," implying that all its ice and snow would melt. That would require such a large increase in temperature that the entire population of the subcontinent (at least) would likely have died from heat prostration long before Mount Everest were stripped of its ice and snow. In other words, by the time the mountain had been reduced to a bare rock far more serious extra-Himalayan problems would have diverted attention.

Of more immediate concern, however, is that this form of over-dramatic activism runs the risk of substantial misrepresentation. It may also deflect from some of the actual problems facing the Sagarmatha National Park and World Heritage site. These include:

- Severe damage to the upper timberline belt vegetation and the alpine meadows by large numbers of trekkers and their porters (Byers 2004);
- An excessive number of mountaineering expeditions permitted by the government;
- Inefficient park management too closely controlled from Kathmandu;
- Environmental damage perpetuated by the Nepalese military;
- The Maoist Insurgency;
- Over-dramatized reporting that may undermine the credibility of environmentalists.

Regardless of the above discussion, before any action is undertaken, the local people, the Sherpas, who have managed to survive quite successfully for several hundred years, need to be consulted. What are their views? How do they rank the problems, both environmental and socioeconomic, that they face? And can they advise all the many friends of the Khumbu worldwide if and how assistance can be provided?

I will conclude with a short homily that deals with the reliability of the news media. It derives not from the Himalaya but from Vatnajökull, Iceland.

Last February I was invited by Matthew Roberts, an English glaciologist working for the Icelandic Meteorological Office, and Ragnar Kristjansson, Superintendent of Skaftafell National Park, to walk with them up one of the local glaciers. This was to retrieve instruments that Matthew had installed the previous autumn for jökulhlaup study.

On our walk down we were met by a Canadian Broadcasting Corporation TV crew who had been invited to interview Matthew for his views on the rapid melting of Iceland's glaciers. I became an accidental "booby prize" for the TV crew when they learned that "this old man" had actually been involved in mapping and photographing the local glaciers for more than fifty years—here was an unexpected authentic first-hand account! I agreed that I had witnessed substantial glacier thinning and retreat. However, I added that it must be borne in mind that during the

Viking settlement period over a 1000 years ago the glaciers and ice caps were probably significantly smaller than they are today. This caused some dismay. But when I fortuitously witnessed the TV report at home 3 weeks later, the dismay was on me. When the relevant part of my interview was reached, while my lips continued to move, no sound emerged except for the voice-over of the reporter repeating that, yes indeed, due to global warming the recent collapse of the glaciers had been massive.

Is credibility no longer important?

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Peter Roderick responds

It is a daunting task to respond to someone as eminent as Jack Ives on matters Himalayan (see above: *Global Warming—A Threat to Mount Everest?*). But respond I must. Having read his piece several times, I fear—and I use the verb with consideration and respect—that he hasn't grasped the seriousness of the situation.

He sets out to assess the "relevancy, accuracy, and effectiveness" of the growing number of "alarms that link Mount Everest, or other glacierized mountain regions, with global warming." And includes in the hype the recent UNESCO petition to place Sagarmatha National Park on the List of World Heritage in Danger because of climate change, on which I'm one of the petitioners.

Alarms. Indeed, there are lots of exaggerated media reports. And Jack's Icelandic treatment on the TV sounds particularly disrespectful. For a long time now, alas, my initial response has been to disbelieve almost all media reports, as a defense to being seriously misled. And to make sure that I work with respected journalists when I approach the media. But alarmist media reports are not to be equated with lack of scientific basis. In the imperfect world we live in, they are not mutually exclusive.

Relevancy and accuracy. I'm no scientist, I'm a lawyer, so I need to know what the scientists and other experts are saying in order to do my job properly. I'm not interested in professional sanctions or a judicial clip around the earhole. So when I read, for example, the UN Intergovernmental Panel on Climate Change (IPCC) and the Organisation for Economic Co-operation and Development (OECD) making the same

IPCC, Third Assessment Report, 2001

Summary for Policy Makers, Working Group 1

- "There has been a widespread retreat of mountain glaciers in non-polar regions during the 20th century."
- "Most of the observed warming over the last 50 years is likely to have been due to the increase in greenhouse gas concentrations;" "likely" is a defined term, meaning 67–90% confidence in the judgment.

"Robust findings," Summary for Policy Makers, Synthesis Report

- "Most of observed warming over last 50 years likely due to increases in greenhouse gas concentrations due to human activities."
- "Global average surface temperature during 21st century rising at rates very likely without precedent during last 10,000 years;" "very likely" defined as 90–99% confidence.
- "Glaciers and permafrost will continue to retreat."

("a robust finding for climate change is defined as one that holds under a variety of approaches, methods, models, and assumptions, and one that is expected to be relatively unaffected by uncertainties.")

OECD, 2003

Development and Climate Change in Nepal: Focus on Water Resources and Hydropower

"Analysis of recent climatic trends reveals a significant warming trend in recent decades which has been even more pronounced at higher altitudes. Climate change scenarios for Nepal… show considerable convergence on continued warming, with country averaged mean temperature increases of 1.2°C and 3°C projected by 2050 and 2100. Warming trends have already had significant impacts in the Nepal Himalayas—most significantly in terms of glacier retreat and significant increases in the size and volume of glacial lakes, making them more prone to Glacial Lake Outburst Flooding (GLOF). Continued glacier retreat can also reduce dry season flows fed by glacier melt, while there is moderate confidence across climate models that the monsoon might intensify under climate change. This contributes to enhanced variability of river flows. A subjective ranking of key impacts and vulnerabilities in Nepal identifies water resources and hydropower as being of the highest priority in terms of certainty, urgency, and severity of impact, as well as the importance of the resource being affected."

consistent statements of the kind in the Boxes on the previous page and above, I wish to respect and respond to those statements. As would a judge.

I'm with Jack on the reported flaws in the ICIMOD study. These are important matters of detail that we call in the petition to be urgently addressed. But nobody, including Jack, is questioning the thrust. His question, too, about "what can anyone do to protect Mt Everest from climate change?" is a critical one. I fear it might be too late. In the words of the World Glacier Monitoring Service's FOG8 report (Fluctuations of Glaciers, 1995–2000, vol 8), "[w]ith a realistic scenario of future atmospheric warming, almost complete deglaciation of many mountain ranges could occur within decades." But does it follow that we don't try? And I have no wish to minimize the other significant problems facing the Park that Jack lists. Though describing these as "actual" problems, implying that climate change is *not* a problem, is not in my view objectively sustainable.

I'm pleased to say that at the UNESCO World Heritage Committee meeting in South Africa in July 2005, the issue was taken seriously and the petitions led to an unprecedented discussion on the impacts of climate change on world heritage. The Committee recognized the genuine nature of the concerns expressed in the petitions (which included a petition on the Huascaran National Park in the Peruvian Andes) and set up an expert working group to review the impacts of climate change on World Heritage Sites and to report back to the next meeting. We are pleased with this outcome, because if drastic cuts in greenhouse gases are not made, the legal obligation under the World Heritage Convention to pass many of the best parts of the planet to future generations will not be complied with—the legal basis for the petitions in the first place.

We're coming from the same place, Jack. Please don't let the irritating alarms deafen the voices of reason. We need to hear and see both behind and beyond them.

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Comment

Traditional Architecture in Tibet: Linking Issues of Environmental and Cultural Sustainability

William Semple, MRD Vol 25 No 1, pp 15–19.

I was very much interested and fascinated by William Semple's article on "Traditional Architecture in Tibet" (MRD Vol 25 No 1). My appreciation was enhanced by a working stint in Bhutan and Northern Nepal, but not Tibet unfortunately. I applaud the policy Semple is trying to have applied in Qomolangma of specifying that restoration must use local, traditional materials and local building methods and builders—the best way to get true "authenticity" in restoration if World Heritage status is hoped for. I wonder if we should not be busy establishing "historic forests" which will serve to supply the needed authentic wood material for restoration efforts, similar in function to the temple forests which have been protected as sources of repair material, or occasionally for financial support for "sacred structures?"

But, I was disappointed to see Semple repeating the old claim, discredited by many articles in this Journal, that "Heavy rainfall in the region combined with deforestation was seen as one of the major reasons for the devastating flooding on the Yangtse and other rivers during the summer of 1998." (Surely Drs Jack Ives and Bruno Messerli are disappointed that the message in *The Himalayan Dilemma* has not gotten through to Author Semple). The logging ban enacted—as was also the case in Thailand's logging ban in 1988—is missing the target, and placing strain on the forests elsewhere, while contributing little to flood reduction.

Semple's recommendations for sustainable ecotourism and maintenance of traditional architecture are excellent, in my opinion.

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