



HEATING THE CLIMATE OF THE THIRD POLE

Number 2 in a series of 10 briefings on climate and Tibet

Everyone knows Tibet is high, and glacially cold, which is why many scientists call it the Third Pole.

But, unlike the other Poles, Tibet is intensely sunny, and Lhasa, the capital, is actually closer to the equator than Miami, Cairo, Baghdad, New Orleans, Delhi or Shanghai. So the thin, clear sunny skies of Tibet can also heat dramatically in spring and summer, making Tibet an engine of global climate.

The heating of the Tibetan Plateau is so strong that scientists have recently discovered how much Tibet drives the monsoon rains that all of Asia's farmers, and cultures, depend on. The heating of the Plateau generates such an intense low pressure, over a land as big as western Europe, that heavy rain clouds building up over distant tropical oceans are drawn deep inland, even to Tibet itself, which also gets most of its rain from monsoon clouds somehow getting through the Himalayan barrier.

The role of Tibet as driver and regulator of planetary climate is quite unique, and it is only in recent years that science has begun to understand this remarkable climate engine. Only now is there sufficient data to put together the picture of how events in Tibet, in spring, determine whether the summer monsoons across Asia will be plentiful, or disastrously- whether the monsoon will fail or, at the other extreme, flooding rains will devastate downstream farmers and towns.

This means Tibet, the entire plateau covering one quarter of China's total area, is uniquely susceptible to climate change; its ancient role as regulator and driver of the monsoons susceptible to man-made interference. Climate change in Tibet is of concern not just to the six million Tibetans, but to the planet. Even the monsoon rains in Australia, in the Southern Hemisphere, are much influenced by Tibet.

An intense scientific effort, by Chinese and international scientists, in the past decade, has focused on the critical role of snow cover on the ground across Tibet, especially in spring. If snow persists into spring, without melting at the usual time, the consequences are many. For nomads, spring snow is bad news because animals, weak from overwintering in pens, urgently need freshly growing grasses, but they remain buried under snow, the ground too cold for regrowth to begin and snow too deep for weak animals to paw through. For Asia as a whole, unusually heavy spring snow on Tibet means the sunlight reaching Tibet bounces off the white snow cover, rather than being absorbed by growing green grasses and sedges. This perpetuates the cold air temperatures, delaying the heating of Tibet, thus weakening the monsoon. Scientists are now convinced they have strong evidence that spring snow on Tibet makes for a weak, late or even a failed monsoon months later.

The surface of Tibet matters. A natural surface of snow peaks and glaciers at high altitude, alpine meadows below, with many lakes, wetlands and rivers lower still, has long guaranteed Asia's climate. Now man-made disturbance and degradation are evident everywhere. The human impacts on Tibet over the past 50 years are dramatic. The forests of southeastern Tibet were destroyed, permanently reducing rainfall in the most fertile corner of Tibet best able to attract monsoon rains. Rivers are dammed, increasingly in endless cascade series to capture and impound water for hydropower, especially on the great rivers of Asia as they tumble down from the plateau. The innumerable lakes of Tibet are dropping, according to dozens of scientific reports, and the glaciers are fast melting.

But the most widespread impact is out on the great rangelands created and cared for by Tibetan nomads over thousands of years, with their herds of yaks, sheep, goats and horses. Those grasslands were grazed sustainably, by moving herds onto fresh pasture, allowing grasses to regrow, for centuries.

But in recent decades, the grasslands have rapidly degraded, the living turf has died, exposing black soil to the biting winter winds and blizzards, until only bare rock remains. Decades of official insistence on building up herd sizes, far beyond what nomads knew to be sustainable has set off a chain of degradation, with almost no official finance for rehabilitation.

The consequences for the nomads are dire. Their mature animals now weigh much less than only a few decades ago, as living turf turns to dead black soil, and invasive weeds take over, and burrowing rodents in plague proportions infest the grasslands.

Careful scientific fieldwork now confirms what nomads have always known: that Tibetan pastures, steadily but lightly grazed, are highly productive and sustainable; that the pasture plants maintain a wide biodiversity when grazed and diminished biodiversity, with more weed invasion and fewer medicinal species, if grazing is excluded, in the name of watershed conservation.

The way to maintain the great rangelands of Tibet as a carbon sink is to allow grazing, and to assist the pastoral nomads to plant grass seeds in areas damaged by fencing them in to areas too small for their herds. These basic methods of grassland rehabilitation have not been tried; nor has China, a country unfamiliar with grassland dynamics, asked the nomads how their traditional knowledge enables them to manage the risks of pasture management.

Tibet is drying, heating and accelerating climate change. A negative feedback loop is in place, exaggerating the global climate trend, to such an extent that Tibet has become one of the fastest warming parts of the planet, according to many scientific research reports. As Tibet turns increasingly from green to black in summer (black rock, black soil) the heating intensifies, but it is too late to generate a healthy monsoon. On the other hand, Tibet also turns from green to white in winter and spring, when oceanic oscillations (the Indian Ocean dipole) make for heavier and later snow than usual.

As Tibet heats and dries, this negative cycle intensifies. Frozen soils hold water, as ice, which melts in spring, just at a time when crops and wetland plants reach down, before the monsoon arrives, for water. Now the permafrost of Tibet is anything but permanent, melting earlier and earlier, depriving crop and wetland plant roots of moisture. As crops and wetlands die, the bare soil is exposed to the gales that blow fiercely in Tibet. The blackening accelerates, the heating intensifies.

China's investments in Tibet are concentrated in urban construction, mines and transport corridors. The vast grasslands have been neglected, attracting almost no investment. The nomads now are compulsorily removed from degrading grasslands on the grounds that regrowth of grass, to protect China's upper watersheds, is possible only if livestock and nomads are removed. The victims of past policy failure, and of climate change, are made to pay for the mistakes of others.

The nomads of Tibet could be part of the solution. If China adopted contemporary best practice, the nomads would be empowered and resourced, given seeds and help to make the black soil green again. Instead, they are blamed and removed, excluded from ancestral lands officially guaranteed to them in the 1990s as a long term promise of legal tenure.

This is a tragedy, not only for the nomads and their intimate knowledge of grassland dynamics, but for the planet. China has done almost nothing to maintain wildlife habitats, as biodiversity biologist Richard Harris points out in his 2008 book *Wildlife Conservation in China*; nor has China invested in rehabilitating grazing lands.

A major tragedy of the 19th century was the herding of American Indians and Australian Aborigines onto reserves, where their skills were redundant, their lives pointless, leaving them vulnerable to diseases of overcrowding, and despair. The Indians and Aborigines not only survived, but those who saw them as primitive, an obstacle to modernity, have learned to respect indigenous knowledge, especially in sustainable management of the vast plains of continental interiors.

China persists in seeing Tibetan nomads as poor, backward, remote, ignorant, greedy, selfish and unaware of the consequences of their grazing practices. They depict the nomads as enemies of watershed conservation, on the simplistic

WANT TO KNOW MORE?

This overview introduces a series of briefings on specific topics, in more detail. This briefing summarises the impacts of climate change on Tibet and, via Tibet, on our planet. Other briefings in this series include references to the sources of data used. The briefings rely on the latest scientific findings by international scientists, including many Chinese scientific institutes.