

Dzo: The Mule of the Himalayas in a Changing Climate

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Dzos carrying loads, Nepal. Photo: Celine Curi.

With a large number of ethnic societies having their own social, economic and cultural attributes living in a highly heterogeneous mountain environment, any developmental initiative in the Himalayas has to be based upon a value system that they understand, practice and is sustainable.

The Himalayas are characterised by highly complex socio-ecological systems, with rich cultural diversity linked with equally rich biological diversity. However, it is a paradox that the majority of people living in this biologically rich region are among the poorest in the world. Agriculture, being the most dependable livelihood option available to these people has evolved significantly over the centuries to cater to their subsistence needs. Based on the agro-climatic zones and farming practices, the Himalayas can be broadly categorised into five major systems. Each of these systems can be characterised by i) specialised pastoralism (purely livestock based, a high altitude transhuman subsistence livelihood); ii) mixed mountain agro-pastoralism (livestock, agriculture and agroforestry livelihoods based in the mid hills); iii) cereal based hill farming systems (agriculture based livelihoods in the low and mid hill areas); iv) shifting cultivation (livelihoods based on rotational agroforestry with slash and burn practices) and v) specialised commercial systems (livelihoods based on monoculture and other commercial crops). In each of these specialised systems, there is a variation in crops and cropping patterns which supports a wide range of agro-biodiversity that is the sources of food, nutrients and economic prosperity for the region.

Among these broad farming systems, specialised pastoralism is one of the oldest systems in the world. The people living in one of the harsh ecological zones in higher and trans-Himalayan region have been practicing this system for a hundred years providing vital nutrients to the majority of the mountain people. This practice is widely found in the Hindu Kush Himalayan (HKH) region starting from Afghanistan in the west to the Himalayan and trans-Himalayan regions of Pakistan, China, Nepal, Bhutan and India. These people's age-old dependency on the high pastures and livestock products are embedded in their culture and practices, governed by

traditional knowledge and natural resources governance mechanisms. This article shows how they are sustaining their hard life with practically little or no change in their lifestyle in spite of prevailing climate change threats. Examination of the climate change scenario in the HKH shows the link to age old traditional practices used by the mountain people to survive.

Climate change as a global threat to humanity

The Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) predicted that climate change would impose significant stress on natural resources throughout the planet. The Himalayan region is home to more than 15 percent of the world's population. However, in the Himalayas, climatic factors depend on various bio-physical parameters including a wide range of altitudinal zones and microclimatic conditions. These range from tropical to arctic, creating highly diverse ecosystems with high biodiversity. The people living in the area are highly depended on natural resources such as agriculture, forest, grassland and snow capped mountains and glaciers for various goods and services. However, the natural resources are already under stress due to an ever rising population, modernisation and erosion of age old traditional practices. As a result, the resilience capacities of most of the fragile ecosystems found in the Himalayas are vulnerable to new and emerging threats such as climate change.

The eastern Himalayas are characterised by very low to high temperatures, heavy rainfall, often excessive humidity and marked seasonal variations. Rainfall in the Himalayas, especially in the eastern Himalayas, is concentrated in the monsoon season with 60 to 90 percent of total rainfall occurring during this period. Agriculture and agricultural products contribute the greatest share of GDP in the region. In addition, agriculture also provides a livelihood for nearly three quarters of the labour force. A heavy reliance on agriculture, as well as on other climate-sensitive sectors such as hydropower and tourism, make the economies of the region a highly vulnerable to climate variability.

The eastern Himalayas are facing enormous pressures from various drivers of global change including climate change. However, the prevailing climate change knowledge from the mountains is somewhat incomplete and scattered. Anecdotal evidence from the HKH are raising alarm signals on the fate of Himalayan biodiversity. It is predicted that a temperature increase of two degrees Celsius would shift the crop cultivation zone 10 metres north into the higher elevation areas. This may seem a positive spinoff, as this situation might increase the temperature leading to higher carbon dioxide levels that may have positive impacts on crop yields. However this would happen only where moisture is not a constraint. Due to steep slopes and limited arable land, such a spinoff would not have any promising advantages for agriculture in high land areas.

Traditional knowledge and adaptation

Human communities living in the Himalayas have always generated, refined and passed on knowledge from generation to generation. Such 'traditional knowledge' is often an important part of their cultural identities playing a vital role in the daily lives of a vast majority of people, especially on food security and health. Pastoralist communities living in the high Himalayas and trans-Himalayan region of the HKH have been practicing numerous indigenous practices to cope up with climatic variability since time immemorial. One such practice

has been the rearing of yaks in the high mountain regions and supplementing it with dzo (a male hybrid of yak and local cow) during the unfavorable seasons.

Sikkim is located in the north-eastern part of India in the eastern Himalayas. The yak rearing history of Sikkim dates back to the Chogyal (King) period when it was a kingdom in itself, before 1975 when Sikkim was formally merged as the 25th state of India. During the Cultural Revolution in the Tibetan Autonomous Region of China many Tibetan people fled to Sikkim seeking asylum. Among them, about 10 families were given a plot of land in the high altitude area of west Sikkim, the present Khangchendzonga (Kanchenjunga) Biosphere Reserve. These 10 families formally started their livelihoods in Tshoka (3,000 metres) along the present Yuksam-Dzongri trekking trail from 1969. Historically, from 1954 onwards, the Himalayan Mountaineering Institute (HMI) in Darjeeling, started their mountaineering courses in the Mount Khangchendzonga area, providing livelihood options for these new settlers. With this new opportunity, the people living in this isolated forested area with limited livelihood options, brought a few dzo from Holung of Nepal in 1971 to cater to the needs of the HMI for carrying goods and training equipment. Soon after that, people started hybridising their local cows with yaks and started to produce this mysterious beast.

Although sheep, horses and goats are pastoral wealth for other communities, dzo and dzomo (female) are choice animals for Tibetans, due to their adaptability to the harsh physiographic features of the region. Yak or 'ya', as pronounced by the Tibetans, are called 'nor' which means 'jewel' or 'wealth'. This term only applies to males, the female being called 'dri'. In Sikkim, yak/cow hybrids are bred using yaks and domestic cows or, less often, domestic bulls on dri to produce dzo (male offspring) and dzomo (female offspring). As they are a product of the hybrid genetic phenomenon of heterosis, they are larger and stronger than cattle or yaks. The female hybrids are fertile but the males are sterile. A dzomo crossed with either a domestic or yak bull results in an ortoom (second generation) and an ortoom crossed with a domestic or yak bull results in a usanguzee (third generation). Normally, the males of ortoom and usanguzee are known as tolu and are immediately killed after their birth as these animals are sterile and useless. Females, however, are more productive in terms of milk compared to the dri. This hybridisation (see Table 1) is practiced all over the Himalayas and trans-Himalayan areas and normally the dzos are used as draught animals.

Table 1. Matrix showing the hybridisation between yaks and domestic breeds practiced in Tshoka, Sikkim.

Breeds	Domestic cow	Domestic bull	Yak
Yak	Dzo+Dzomo-		
Dri		Dzo+Dzomo-	
Dzomo		Tolu+Ortoom -	Tolu+Ortoom-
Ortoom		Tolu+Usanguzee-	Tolu+Usanguzee-

Dzo - utility value in the context of climate change

In Sikkim, dzo are normally used as pack animals for tourism purposes. This has provided a strong rationale for their hybridisation and use in economic development for people living in Tshoka. Yuksam-Dzongri is a trekking trail located in the western part of the state of Sikkim in India. It is 26 kilometres long and covers a range of elevation from 1,780 metres to 4,000 metres. The trail passes through Sachen, Bakhim and Tshoka in



Timber to Tibet on dzo, Nepal. Photo: Ujol Sherchan.

the south-western part of the Khangchendzonga Biosphere Reserve in Sikkim. Yuksam is a trailhead for this corridor and leads to the base camp of Mount Khangchendzonga through Dzongri, Thangsing and Gocha La in West Sikkim. Yuksam (1,780 metres) has 11 settlements with 274 households comprising a population of 1,573. Tshoka with 10 households is situated inside the reserve at Tshoka (3,000 metres) and is along the trekking trail. People in Tshoka have very limited options for making a living but can take advantage of the economic benefits tourism can bring.

The people of Tshoka started using dzo as pack animals. During each training course organised by the HMI, they would bring the required number of dzo to Yuksam. The rationale for using dzo is that as a hybrid of a yak and cow, it can withstand with the high temperatures of Yuksam (30-32 degrees Celsius) which yaks normally cannot stand. In addition, a dzo can carry more weight than a domestic cow or bull and can walk through any terrain with a load up to 6,000 metres, withstanding -15 degrees Celsius without difficulties. Thus, this hybrid has become the most promising source of income for Tshoka people. Similarly, the dzomo, ortoom and usanguzee are more productive in milk and can survive at a wide range of altitudinal zones during seasonal migration compared to yaks, which are normally known for less milk and being limited to alpine zones above 3,500 metres. This new avenue is earning more money for people compared to yak or dri rearing. In 1990, almost 200 yaks and dri died due to unprecedented and continuous snowfall in the high altitude area of Dzongri and above but the people did not starve as they had quite a number of dzo, dzomo, ortoom and usanguzee to compensate for the loss.

Genetically, the hybrid does not show any advantages over yaks or even domestic cows. They simply follow Mendelian inheritance. About half the hybrids resemble cows (as seen in dzomo), presumably having received the 'cow' alleles in duplicate; while the other half resemble yaks (as seen on dzo), having presumably received one 'cow' and one (dominant) 'yak' allele. In addition, it is also observed that the pulmonary arterial pressure and resistance necessary for high altitude environment were significantly higher in indigenous Himalayan cattle than in the yaks. However, the pulmonary arterial resistance, an adaptive mutation in the arterial wall that enhances the capacity of animals to withstand a low oxygen

supply, was slightly higher in the dzo and yak than in domestic cattle. This is the reason why people prefer to cross a yak with a cow rather than a domestic bull with a dri. The indigenous knowledge practiced by Tibetans as well as high altitude pastoralist communities has a strong rationale base: Mendelian inheritance which has been used for centuries.

Many families from Yuksam and the surrounding area now also rear dzo to meet the increasing demand for pack animals due to the increasing tourism in this area. The Government of Sikkim also encourages having dzo and dzomo that have greater flexibility in using lower as well as higher pastures seasonally. Such practice minimises the degradation of high alpine pastures due to higher numbers of unproductive yaks.

References

Anand, I S; Harris, E; Ferrari, E; Pearce, P; Harris, P (1986) *Pulmonary haemodynamics of the yak, cattle, and cross breeds at high altitude*. Thorax, 41:696-700.

Chettri, N (2008) *Experience of a herder's life in western Bhutan*. Mountain Forum Bulletin, Vol Viii, Issue 1: 19-21. URL: <http://www.mtnforum.org/rs/bulletins/mf-bulletin-2008-01.pdf>

Gyamtsho, P (2000) *Economy of yak herders*. Journal of Bhutan Studies, 2 (1) <http://www.bhutanstudies.org.bt/admin/pubFiles/4.yakeconomy.pdf>

Tambe, S; Bhutia, N T; Arrawatia, M L (2005) *People's opinion on the impacts of "Ban on Grazing" Barsey Rhododendron Sanctuary, Sikkim, India*. The Mountain Institute, Sikkim, India.

Singh, H B; Sundriyal, R C; Sharma, E (2003) *Livestock grazing in the Khanchendzonga Biosphere Reserve of Sikkim Himalaya, India*. The Indian Foresters 129(5): 610-623.

Xu, J; Shrestha, A; Vaidya, R; Errisson, M; Hewitt, K; (2007) *The Melting Himalayas: Regional Challenges and Local Impacts of Climate Change on Mountain Ecosystem and Livelihoods*. International Centre for Integrated Mountain and Development, Kathmandu, Nepal.

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