

Indigenous lifestyles and biodiversity conservation issues in North Sikkim

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Sikkim is a well known treasure trove and hotspot of biodiversity with most of its macro fauna and flora well documented over the last two centuries. The ethnic populace living in remoter areas of the state relies on an intimate knowledge of the local bio-resources for their survival in a harsh high altitude environment. Over time this has been seen as the only means of their survival. Lack of any systematic documentation in written form and reliance on oral tradition along with recent development and modernization activities is leading to irretrievable loss of this ancient wisdom.

Studies of three short projects in North Sikkim to document some of the biogeographic history including some of the traditional methods of wildlife conservation and subsistence lifestyles among the truly nomadic *Dokpas* in the cold desert and partially trans-humant *Bhutia* tribals of Lachen and Lachung valleys, who practice the *Dzumsa* traditional system of administration were conducted. Some of the management practices now degrading rapidly were more for sustainable use than conservation *per se*, and thus not in harmony with the present legal systems of the state and country. It is proposed that part of this area be declared as a trans-boundary Conservation Reserve to achieve the dual objective of conservation through sustainable use and equitable sharing of both bioresources and traditional knowledge.

Keywords: Sikkim, *Dokpas*, *Lachen*, *Lachung*, *Dzumsa*, *Bhutia*, Cold desert, Trans Himalaya, Biodiversity conservation

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The high cold desert of the Tso Lhamo plateau and the Lhonak Valley to the North of Sikkim contiguous with the Tibetan Plateau of the TAR of China harbours a large number of unique wild taxa as well as a small population of Tibetan nomads or *Dokpas*, traditional herders of yak, highland sheep and *pashmina* goats as well as a few highland ponies. There are no permanent settlements. The nomadic lifestyle of the last 23 *Dokpa* families is carefully adapted for this Trans-Himalayan ecoregion extending from 4,500-5,500 m with characteristic cold desert vegetation. This ecoregion supports globally threatened animal and bird species like Tibetan Argali *Ovis ammon*, Tibetan Gazelle *Procapra picticauda*, Snow Leopard *Uncia uncia*, Black-necked Crane *Grus nigricollis*, and other endangered species like Kiang *Equus kiang*, Tibetan Wolf *Canis lupus*, Tibetan Snowcock *Tetraogallus tibetanus*, Lammergeier *Gypaetus barbatus*, Golden Eagle *Aquila chrysaetos*, Ruddy Shelduck *Tadorna ferruginea* and many migratory waterfowl¹. The traditional symbiotic relationship between the ethnic tribals and their environment is beginning to break down with serious consequences for both². The Alpine Grassland Ecology Project was initiated in Sikkim in mid-2000 by Bombay Natural History Society in

collaboration with the State Forest Department, with the objective of formulating a long-term wildlife conservation strategy for the biodiversity of unprotected trans-Himalayan and alpine grasslands adjoining the Tibetan Plateau. No long-term studies had been previously undertaken on this region entirely on the international border manned by security forces where major land uses are military initiatives and livestock grazing by a small nomadic community³.

Methodology

The study area was divided into sub-alpine, alpine and trans-Himalayan sites, viz. Lachen-Lachung Valleys; Lashar-Yumesamdong-Dongkia La; Lhonak Valley and the Tso Lhamo Plateau. Data on threatened species in trans-Himalayas was recorded along a 40 km vehicle track in the cold desert over 12 visits from 2000-2003 and later sporadically till 2006. Over 600 opportunistic sightings of flagship species including Kiang *Equus kiang*, Tibetan Gazelle *Procapra picticauda*, Lynx *Lynx lynx*, Golden Eagle *Aquila chrysaetos* and Globally Threatened Species like Tibetan Argali or Nayan *Ovis ammon*, Snow Leopard *Uncia uncia* were obtained with the help of nomadic Tibetan grazers. Bird density and diversity

Table 1 — Some important wild natural resources in Trans-Himalayan Sikkim

Mammals	Carnivores	Red fox, Tibetan fox, Tibetan wolf Himalayan brown bear Martens, Weasels Snow leopard, Lynx, Pallas's cat Kiang
	Herbivores	Tibetan gazelle, Tibetan Argali, Bharal/Blue sheep Himalayan Marmot, Woolly hare, Mouse-Hare, Vole
Birds	Waterbirds	Black-necked crane Bar-headed goose, Ruddy Shelduck, Lesser Sand Plover Common Redshank, migratory waterfowl
	Birds of prey	Golden eagle, Lesser Kestrel Himalayan griffon, Bearded vulture Short-eared owl
	Galliformes Other birds	Tibetan Snowcock, Snow partridge Snow pigeon, Hoopoe, Raven, Himalayan crows, Ground Chough, Redstarts, Grandala, Wallcreeper, Horned lark, Wagtails, Pipits, Robin-Accentor, Snow Finches, Mountain Finches
Amphibians	Pelobatid toads	Sikkim Snow Toads (two species)
Invertebrates	Insects, etc.	Many species of high-altitude butterflies, moths, beetles, craneflies, bees, spiders, velvet mites, snails, amphipods, nematodes
Plants	Alpine grassland and subalpine flora including medicinal plants like	<i>Picrorhiza</i> , <i>Nardostachys</i> , <i>Gentiana</i> , <i>Aconitum</i> , <i>Podophyllum</i> , <i>Meconopsis</i> , <i>Ephedra</i> , etc.; plants with religious significance like <i>Juniperus</i> , <i>Rhododendron</i> ; wild edible plants like nettles, wild onion, ground orchids, edible lichens and fungi (<i>Agaricus</i> spp.), edible algae
Sacred landscapes	Holy lakes, Holy mountains Holy Passes	Gurudongmar Tso, Tso Lhamo, Gyam Tsona and lesser lakes Khangchengyao, Chomoimo, etc Chorten Nyima La, Dongkia La, etc.
	Old Stone <i>Chortens</i> made by <i>Dokpas</i>	

was monitored along 15 transects of 1-1.5 km for three summers in sub-alpine and alpine sites. In addition, an intensive effort was made through participatory public meetings at Lachen, Lachung, Thangu and Muguthang and workshops at Tsunghang and Gangtok, based on which a draft biodiversity conservation strategy was developed and included in the Sikkim State Biodiversity Strategy and Action Plan as part of a national effort and on medicinal plant conservation and sustainable livelihood alternatives⁴.

Results and discussion

As there is contiguity of ecosystems across the border, all wild fauna are trans-border migrants (Table 1). The domestic livestock confined on this side of the international border (IB) is almost equally threatened due to the reduced grazing niche already occupied by large-bodied wild herbivores (Table 2). Grasses, sedges and medicinal herbs grow abundantly during the short four-month growing season which supports a host of insect fauna as well as the wild and domestic herbivores, ground-nesting larks and finches. The area is dominated by presence of several lakes, some great snow mountains and glaciers, all forming the source of Sikkim's principal river Teesta.

Table 2 — Some important domesticated resources

Animal	Yak	pure Tibetan stock
	Dzo	strayed over from Tibet
	Sheep	pure Tibetan stock
	Goat	Pashmina type Tibetan stock
	Horse	of Tibetan and other stock
	Mule	used mostly by military personnel
	Dogs	mongrelized Tibetan mastiff, Lhasa Apso breed
Plants	Cat	
	Potato	
	Spinach	
	Wool	for blankets, sweaters, clothes
Products of Husbandry	Yak hair	for rope, tents
	Yak underwool	for blankets
	Milk	of yak, sheep, goat
	Butter	for lamps, salt tea
	Meat	fresh, dry and matured
	Cheese	dry, wet (<i>Churpi</i>) fermented (<i>Phylu</i>), sweetened (<i>tema</i>)
	Cream	
	Fat	<i>Tsilu</i> stored in stomach pouch
	Skin	as floor mat
	Leather	Shoes
	Tail	as whisk

The preliminary visits highlighted the dominant pressure on the habitat by domestic livestock, feral dogs and seasonal harvesting of medicinal plants (Table 3).

Table 3 — Some wild species and parts used for purported therapeutic purposes

Plant/local name	Parts used	Therapy/Other uses	Remarks	Local status in wild	Conservative method of use
Himalayan marmot <i>Marmota bobak/Chipi</i>	Skin and fat	Purported medicinal use for backache	faces poaching pressure and predation by feral and stray dogs around defence settlements	Uncommon	None
Musk deer <i>Moschus chrysogaster/Lao</i>	Musk pod, canines	Medicine, commercial value	Opportunistically trapped using snares along live rhododendron hedges	Rare	None
Caterpillar-fungus <i>Cordyceps sinensis/Yartcha-Gombuk</i>	Whole caterpillar with Mushroom	Purported medicinal use as tonic and for various ailments	Under intense pressure of clandestine collection from forest areas	Uncommon	Rotational harvest in the past as per rules of <i>Dzumsa</i>
Giant rhubarb <i>Rheum nobile/Chukha</i>	Leaf stem, root	As seasonal food; In Amji medicine : Anti-emetic, diuretic and laxative, heating potency, also for swellings	Nine UV absorbing substances (including five flavonoids) were isolated from its translucent bracts	Uncommon	None; collected when within reach
Himalayan Black Bear <i>Selenarctos himalayanus/Dthom</i>	Bear Bile	Purported medicinal use for fever, cough, colds, etc.		Rare	None; poached especially when found crop-raiding
Cardamine <i>Cardamine macroflora/ Khendu</i>	Tender shoots, buds	Diet supplement	Seasonal wild vegetable	Locally abundant	Opportunistically collected; whole plant not used, but only tender budding shoots plucked
Cobra-Lily <i>Arisaema griffithii/Tho</i>	Roots	Diet supplement	Earlier famine food, now a delicacy; also used as barter material with Tibet	Locally abundant	No iron shovel used to avoid injury to root; instead <i>Malus</i> sp. wooden shovel used; usually three baskets per family allowed; annual harvest in Jul-Aug rotationally, block-wise
Mushrooms <i>Agaricus spp/Shamu</i>	Whole	Diet dupplement	wild collected and excess strung, dried and stored	Seasonal around livestock grazing areas	None
Seabuckthorn <i>Hippophae sp./Taribo</i>	Fruits	Diuretic	Common along river valleys at c. 2500-3000m	Locally abundant	None
<i>Aristolochia griffithii</i>	Creeper	Fodder and fence binding		Rare	None
Algae <i>Chusha</i>	Whole	Diet supplement	Collected from glacial lake areas and stored	Rare	None
<i>Rumex nepalensis/Eushabo</i>	Roots	Natural dye	Used by local cottage industry	Locally abundant	
Dwarf Rhododendron <i>Rhododendron anthopogon/Suma</i>	Leaves	Incense	Religious use	Locally rare	
Dward Juniper <i>Juniperus recurva/Sang-pama</i>	Leaves	Incense	Religious use	Locally rare	
Silver Fir <i>Abies densa/Dungshing</i>	Wood	Timber	Used for house construction, Poles for prayer flags	Locally abundant	
<i>Heracleum</i> sp./Chimphing	Seeds	Spice, medicine	Harvested during short spring	Locally rare	

Observations showed rotational grazing of *c.* 3,000 heads of livestock, being practiced by 17 *Dokpa* (Tibetan) families in an area of *c.* 200 sq km on the plateau, which also forms part of the home range of Schedule-I species such as *Kiang Equus kiang*, Tibetan *Argali* or Nayan *Ovis ammon*, Tibetan Gazelle *Procapra picticaudata*, Black-necked crane *Grus nigricollis*, large numbers of ground nesting finches, larks and breeding grounds for lesser Sand Plover *Charadrius mongolus*, common Redshank *Tringa totanus*, Tibetan Snowcock *Tetraogallus tibetanus*. Wildlife of these areas is vulnerable to various biotic pressures, an important one of which is a population of at least 150 feral dogs. A more detailed study was initiated on the bird communities in the alpine and sub-alpine regions.

Observations showed that the peak breeding season for both flora and fauna is between July-September. During this period, most of the nomadic *Dokpas* move around on the plateau, while some come from Lashar. Around seven families restrict their livestock migration out from Lhonak valley. The movements of camps have a distinct pattern with rotational grazing areas and imposition of fines by the *Pipon* for irregular grazing. Major medicinal plants harvested are *Nardostachys grandiflora*, *Picrorhiza kurroa*, *Juniperus procata*, *Podophyllum hexandrum*, *Rhododendron setosum*, and *R. nivale*⁵.

Large mammals include the *Kiang* or Tibetan wild ass *Equus kiang*, *Argali/Nayan* or Great Tibetan sheep *Ovis ammon*, Tibetan gazelle *Procapra picticaudata*, *Bharal* or Blue sheep *Pseudois nayaur*, domestic yak *Bos grunniens*, domestic sheep and goats of hardy Tibetan stock and a few horses. The smaller mammals of the area include Himalayan Marmot *Marmota bobak*, Woolly hare *Lepus oiostolus*, Mouse-hare *Ochotona thibetana*, *O. macrotis* and Voles *Microtus* sp.⁶⁻⁸.

The major birds of the area include Mountain and Snow Finches, Horned Larks, Accentors, Redstarts, Pipits and Rosefinches⁹. Human population consists of the nomads, the partially trans-humant *Bhutia* and large number of defence personnel, road maintenance labourers and their settlements. Closure of the border to trans-humance over the last four decades has led to intense grazing pressure by both the domestic and wild herbivores on the limited resources of the land. The area also suffers from the presence of loosely fenced land-mined areas causing casualties among yak, Tibetan argali, kiang and Tibetan wolf. Proliferation of feral dogs over the last few decades

and opportunistic poaching by non-native residents of the area are major hazards in this region³.

All the high altitude passes form traditional migratory routes of various species. The Chulung La is probably the only pass in the Indian sub-continent if not the world for such large populations of 150-200 Tibetan *Argali* or Nayan, a globally threatened species, Sese La and Bam Tso La for *Kiang*, Kongra La, and Chulung, Chomdo, Bam Tso La for Tibetan Gazelle, Naku La for the globally threatened Black-necked Crane, are some examples^{2,10,11}.

During the reign of the *Chogyal* or Maharaja of Sikkim, these areas faced severe lack of communication; their weak economic condition mandated dependence on available natural resources which were perforce used wisely. The *Chogyal* gave concessions for grazing and wild harvesting (*Chogyal Lachungpa* personal communication). The Dzumsa strictly banned poaching. Poaching of musk deer or any other animal resulted in a stiff fine and could also attract extradition from the Dzumsa. Conservation of bioresources was ensured when the *Chogyal* allowed regulated hunting or when religious belief disallowed consumption of meat at a time coinciding with the breeding season of birds and animals (*Chogyal Lachungpa* personal communication). When the Indian Wildlife (Protection) Act 1972 became applicable in Sikkim, the State Forest Department along with the Dzumsa declared ban on hunting, organized trap demolition operations and apprehended Musk Deer poachers (*Chogyal Lachungpa* personal communication). The Dzumsa along with the *Gompa* or monasteries banned wild extraction of honey which caused loss of so many little lives. This would have only had a positive influence on forest pollination (*Chogyal Lachungpa* personal communication). These institutions were also responsible for conservation of water sources called *Chulumbo* or *Devithans*, which afforded sanctity of waterholes for wildlife, aided fish migration and afforded breeding spaces for lesser life forms (*Chogyal Lachungpa* personal communication). The Black-necked crane, *Grus nigricollis* is considered a holy bird called *Tcha-Tung-Tung* and is not hunted. Similarly, *Dzumsa* afforded protection to migratory waterfowl like Bar-headed geese *Anser indicus* locally called, *Karaang-Kuruung* in the lower altitudes (*Nyisha Lachungpa* personal communication).

The old system of sky burials practiced by the Tibetan nomads was responsible for conservation of the different species of high altitude vultures such as

Bearded vulture *Gypaetus barbatus* and Himalayan Griffon *Gyps himalayensis*. The conservation ethics practiced by these simple folks is evident even today as the best sightings of endangered species are in and around their settlements.

This system is however changing over the last few decades. As more and more benefits in the form of infrastructure developments, vehicular access, and other government aid have reached these interior areas, there have been increasing instances of poaching, snaring of wildlife, clandestine collection of vast quantities of Caterpillar-fungus from protected areas, pollution of sacred spaces due to unregulated tourism and many other negative influences. Even today, skulls of carnivores and birds of prey as well as rats are used for religious rituals in some of the most modern homes. In many homes a wild animal skull or an owl's head is often hung outside the door to ward off evil spirits. As the more enterprising tribals are moving out their habitats, there is no sense of belonging. With more materialistic lifestyles, purchasing power and weakening of the *Dzumsa*, need is changing to greed in a biodiversity hotspot so ecologically fragile that any further damage would be irreversible.

The Tso Lhamo Cold Desert could be declared a Conservation Reserve managed by the locally formed Conservation Reserve Management Committee consisting of conservation conscious individuals including from religious institutions, assisted by a trans-Himalayan joint forest management committee and at least two local environment NGOs. The ecoregion already represents three important bird areas (IBAs) of Sikkim recognized by the state government and is a known hotspot for medicinal plants. Improvement of existing livelihoods, feral dog control, fencing of land-mined areas, garbage management; joint patrolling by forest and military and setting up of a high altitude research station would aid the conservation of bioresources.

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