

Pastoral Nomads of the Indian Changthang: Production System, Landuse and Socioeconomic Changes

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Introduction

The Changthang region in the Indian Trans-Himalayan area of Ladakh represents the western extension of the Tibetan Plateau, an important highland grazing ecosystem (Goldstein and Beall, 1990). The *Changpa*, nomadic pastoralists who originally migrated from Tibet in the eighth century A.D. (Jina, 1995), graze the rangelands of Changthang. The *Changpa* are Buddhists and share cultural and linguistic affinities with Tibet (Rizvi, 1996). They lost access to several traditional pastures on the Tibetan side when India and China fought a war in the region in 1962 (Ahmed, 1997). Around the same time, the Indian side saw a heavy influx of Tibetan refugees (popularly known as TRs), who, like the *Changpa*, rear a variety of livestock including horse, yak, sheep and goat. These livestock types are adapted to the hostile and marginal pastures of the region, and provide a range of products and services. The domestic goats of Changthang reportedly produce the finest cash-

mere wool or *Pashmina* in the world (Misra *et al.*, 1998; Ahmed, 2002). The Government of India has been facilitating *Pashmina* production by providing incentives to the *Changpas* for several decades, in the form of supplementary cattle feed during severe winters and subsidized food provisions etc.

Recent studies of the people of Changthang suggest considerable social, economic and land tenure changes, particularly during the period after the war between India and China (Saberwal, 1996; Jina, 1999; Chaudhuri, 2000; Ahmed, 2002; Hagalia, 2004; Goodall, 2004; Rawat and Adhikari, 2005; Rösing, 2006). These studies were conducted primarily in the Rupshu-Kharnak area that is relatively close to the district headquarters, Leh, and is an important tourist destination. However, there is virtually no information from other parts of Changthang, especially the eastern Hanle Valley bordering China (c. 3,000 km²; 32°N, 78°E), a remote area which is out of bounds for foreign nationals, and for which Indian nationals need a special permit. The Hanle Valley is an important area for wildlife conservation. It supports the last surviving population of the Tibetan gazelle *Procapra picticaudata* in Ladakh, a species on the brink of extinction in India (Bhatnagar *et al.*, 2006a). Hunting in the past, and excessive livestock grazing in its high altitude habitat, have caused a dramatic range reduction for the gazelle from c. 30,000 to less than 100 km² within the last century. The Hanle Valley also supports a relatively high density of kiang *Equus kiang*, a species of wild ass that grazes alongside livestock. Although traditionally tolerated, local people today believe that they compete with livestock for forage, and are thereby compromising cashmere wool production (Bhatnagar *et al.*, 2006b).

Below, we provide an overview of the current grazing system, land tenure, and socio-economy of the *Changpa*

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and the TRs of the Hanle Valley. Understanding these issues is crucial for evaluating the future sustainability and economic viability of pastoralism in Changthang, and also for integrating the concerns of wildlife conservation into the existing landuse practices.

Study Area

The Hanle Valley is located at about 270 km southeast of Leh, the district headquarters. The Hanle River originates in the Zangskar range in eastern Ladakh, and runs northwards draining into the Indus River at Loma. It meanders across a vast expanse of sedge-meadows, which serve as critical pasture for both domestic and wild herbivores. The topography is characterised by undulating terrain interspersed with rocky hills, and the elevation ranges from 4,400–5,800 m above sea level. Changthang is characterised by extreme coldness, aridity, high radiation and strong winds. Due to the low precipitation plant productivity is very low (Rawat and Adhikari, 2005). The growing season is confined to a short period (June–August) in summer, and the vegetation is characterised by alpine steppe communities with medium to sparse cover (20%). The dominant plants of the area include *Stipa* spp., *Carex* spp., *Artemisia* spp., *Salsola* spp. and *Oxytropis* spp. There are no trees except for willow *Salix* spp. planted near human settlements by the local people. The large mammals of the area include the Tibetan gazelle, Tibetan wild ass, blue sheep *Pseudois nayaur*, Tibetan argali (wild sheep) *Ovis ammon* (Namgail & Bagchi, unpublished data) and their predators such as the snow leopard *Uncia uncia*, Tibetan wolf *Canis lupus*, red fox *Vulpes vulpes* and Tibetan sand fox *V. ferrilata* (Namgail *et al.*, 2005). The area is also rich in birds and small mammals (Bagchi *et al.*, 2006).

The herds of Hanle Valley pastoralists consist predominantly of sheep and goats. They also keep a variety of livestock—yak is used for meat, milk (*demo* or the female yak) and transportation (less so in recent years), while horses are used for riding, carrying loads and more recently ploughing agricultural fields. Since the early 1970s many families have also started keeping cows for milk. All the livestock except the cows are grazed in the high pastures (>4,500 m) during most of the year. The cows are grazed in the riverine pastures near the human settlements. In the past three decades, six permanent base-settlements/villages have also been established (Pungug, Khaldu, Naga, Shadey, Bug and Zhingsoma) in the valley (Fig. 1). The primary livelihood of the nomads is cashmere wool from goats. In addition to grazing livestock, people also extract shrubs like *Artemisia* spp. from the rangelands for fuel.

Materials and Methods

Our surveys were carried out between June–August 2004, and January–March 2005. Data were collected largely through semistructured interviews of people both in the six villages and the high pastures. Information on family size and livestock holdings was obtained by interviewing one adult member of all the 281 families (148 *Changpa* and 133 TR) that owned at least one type of livestock. However, per capita income from cashmere, *Khuloo* (yak hair) and wool was determined by interviewing one adult member, preferably the head, of a sample of 25 *Changpa* (138 individuals) and 52 TR (288 individuals) families. Although we strived to obtain accurate information on income during the household surveys, through triangulation whenever possible, it is possible that some people, concerned with tax related issues, provided incorrect figures. Information on land use and socioeconomic changes was gathered by interviewing seven elderly people in the villages. Information on modern developmental activities was collected by interviewing the village headmen, and also by opportunistically interviewing more than 15 knowledgeable people who were asked open-ended questions regarding changes in their pastoral life and the causes and consequences of these changes. The village headmen of both TRs and *Changpa* were consulted for data on the grazing patterns. GPS locations of the *rebos* (herder camps) were recorded to generate a map of the movement patterns of the nomads. Three officials from the Sheep Husbandry Department, Leh, were also interviewed in June 2004 and April 2005 to gather information on recent government interventions in enhancing livestock production.

Results

The six villages had a total population of about 1,500 people or an average of 5 people per family.¹ There were about 27,000 head of livestock in early 2004 in the area (Table I), which translates to 18 head of livestock per capita. Goats (65%) comprised bulk of the livestock population, followed by sheep (27%), yak (5%), horse (2%) and cow (1%).

An adult goat produces about 250 g of raw cashmere wool per annum. In 2003, the sample 52 TR families sold a total of 1,287 kg (4.5 kg per capita) of cashmere at an average rate of US \$ 25/kg (Table II), whereas the sample

¹ The data on the *Changpa* and the TRs are pooled and presented together. However, distinctions are made at some places, e.g., the per capita income from cashmere wool, which would be useful for future comparison.

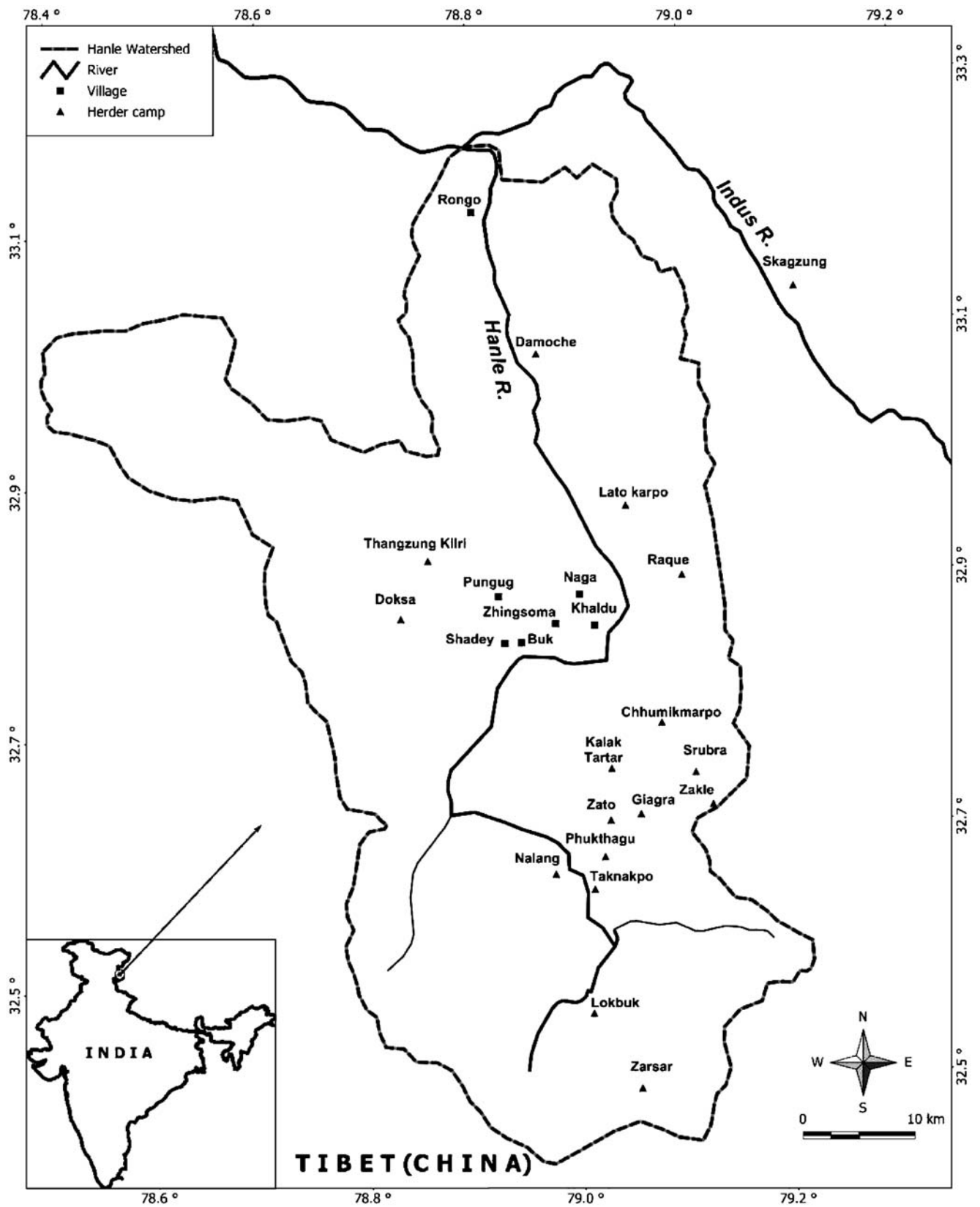


Fig. 1 The locations of villages and herder camps in the study area (Hanle Valley), eastern Ladakh.

Table I Livestock Holding Pattern of the *Changpa* and the Tibetan Refugees (TRs) in the Hanle Valley, Changthang, India

Group	Human	Yak	Horse	Sheep	Goat	Cow	Total
Changpa	741	652 (5.2)	291 (2.3)	3,644 (29.1)	7,762 (62.0)	170 (1.4)	12,519
TR	710	704 (4.8)	253 (1.7)	3,764 (25.8)	9,826 (67.3)	58 (0.4)	14,605
Total	1,451	1,356 (5.0)	544 (2.0)	7,408 (27.3)	17,588 (64.8)	228 (0.8)	27,124

Figures in parentheses are row percentages.

25 *Changpa* families sold 439 kg (3.2 kg per capita). The annual per capita income from cashmere wool was thus about US \$ 115 for TR, and about US \$ 80 for the *Changpa* (Table II). The nomads sell their produce to the middlemen (small scale traders from Leh) who in turn sell it to traders from Kashmir, although this trend is on the decline (see Discussion).

Both *Changpa* and TR social organization is patrilineal and male-dominated. There is however a marked gender distinction in the *Changpa* pastoral production system, with the women involved mostly in milking and dairy processing, while males are responsible for shearing cashmere wool, herding and selling of animals. In the past, *Changpa* society was predominantly polyandrous, where several brothers married a single woman, which perhaps served as a population control mechanism, but this is declining due largely to a change in young people's attitudes. The family is the primary unit of production, but communal cooperation is an important feature of the *Changpa* society. Traditional bartering of several subsistence commodities, such as barley, has also ceased.

Livestock Production System

The 281 families in the Hanle Valley are divided into different herding units: *Kharloog*, *Dique*, *Raque*, *Yulpa* and *Maque*. Historically, these groups had different tasks: *Kharloog* herded the sheep of the Hanle Monastery, *Dique* herded the yaks, *Raque* herded the goats, *Yulpa* herded the livestock of the village, and *Maque* herded the female sheep. Prior to the arrival of the TRs, the livestock population was apparently smaller and the grazing patterns were more relaxed, without clear-cut demarcations and

divisions of pastures. But the increase in human and livestock populations associated with the immigration of TRs in the 1960s led to a more regulated grazing pattern with clearly demarcated pastures earmarked for different seasons (Table III). For instance, *Yulpa* graze the Zhung demo pastures during summer, while *Maque* graze the sedge meadows downstream of the Hanle River Basin, and the *Raque* graze the valleys and mountain slopes of the right bank of the Hanle River downstream of the Hanle Monastery. The *Kharloog* and *Dique* graze in Nalang and Lokbuk respectively, during summer (Table III). All the groups bring the livestock back to the villages in autumn for feeding on stubble in the agricultural fields and the sedge meadows near the villages before they are again taken to the high pastures during winter.

Most of the families (44%, $n=281$) possessed small herds (<50 head), while 3% had very large holdings (>300 head), with the balance having herds of between 50 and 300 livestock, mainly sheep and goats. As a part of the initial adjustments to the influx of TRs into the local grazing system, an upper limit of 25 livestock per person was agreed upon for the TRs as a livestock-population regulatory mechanism. There is no such restriction on the *Changpa*. In the families with large herds (>200), all the members move with the herd except for the school-age children and old people, who stay in the villages, while families with fewer livestock (100–150 head) usually send only one or two members to the high pastures. Families with less than 50 head of livestock usually make arrangements amongst themselves to herd the livestock of several families together. In such cases, the herding families are paid, either in cash or in kind, e.g. butter, meat etc. Such arrangements allow a considerable reduction in manpower required for

Table II *Pashmina*, Wool and *Khuloo* (yak-hair) Sold by the Tibetan Refugees and *Changpas* in the Year 2003

Fibre type	Tibetan refugees ($n=52$)			Changpas ($n=25$)		
	Per household	Per capita	Total	Per household	Per capita	Total
Pashmina	24.8 (632)	4.5 (114)	1,287 (32,860)	17.6 (448)	3.2 (81)	439 (11,209)
Wool	26.3 (112)	4.8 (20)	1,367 (5,817)	24.2 (103)	4.4 (19)	606 (2,579)
Khuloo	4.7 (6)	0.9 (1)	246 (314)	5.9 (7)	1.1 (1)	147 (188)

Figures are in kg, and figures in parentheses represent approximate annual income in US \$.

Market values: pashmina ~ US \$ 25/kg; wool ~ US \$ 5/kg; Khuloo ~ US \$ 1/kg; 1 U S \$ ~ 47 Indian Rupees

Table III Seasonal Grazing Pattern of the Nomadic Pastoralist Groups (Both *Changpa* and Tibetan Refugees) of the Hanle Valley, Changthang, India

Group	Season	Pastures
Kharloog	Summer	Tak Nakpo, Nalang
	Autumn	Village
	Winter	Chhumik Marpo, Tsilung
	Spring	Kyangma Chhumik (Kalak Tartar)
Dique	Summer	Logbuk, Pongnak
	Autumn	Village
	Winter	Srubra, Zakle, Sang Nakpo & Giagra
	Spring	Tungung
Yulpa	Summer	Zong Chhenmo
	Autumn	Village (Pungug)
	Winter	Gongra
	Spring	Doksa
Raque	Summer	Palzue
	Autumn	Village (Khaldo)
	Winter	Dhuti
	Spring	Rathar, Lato karmo
Maque	Summer	Zhung, Chogul
	Autumn	Damochhe
	Winter	Village (Pungug)
	Spring	Daggo, Skilag, Dara

herding, and allow families to engage in other activities such as agriculture, small business enterprises, and cross-border trade (illegal) to supplement their income.

Socioeconomic and Land Use Changes

The socioeconomy of the pastoral people of Hanle is in flux. Amongst the most striking changes are the increasing use of motor vehicles for transportation, and the decline of the polyandry system. Currently there are eight trucks, two tractors, 16 light motor vehicles (cars and jeeps) and about 30 motorbikes in the six villages surveyed. Moreover, there is a bus service plying weekly between Leh and Hanle. Affluent families are also acquiring television sets, and most of them have shifted from the traditional open hearth to smokeless Light-Petroleum-Gas stoves. They are also putting a lot of emphasis on education; currently each village has a primary school. There is a special school for children of the TRs at Pungug, which has a limited number of places for *Changpa* children also.

The nomadic pastoralists are settling down in areas with good access to water, and concrete houses are increasingly being built in these areas. In the Khaldu village alone, there are currently more than 30 concrete houses, compared to only three single-room structures in the 1960s. Furthermore, the diet of the people has presumably undergone considerable changes, with the government providing food provisions such as sugar and rice at subsidized rates. Most of these changes have been accompanied by an increasing

dependence on cash, integration with cash markets, and termination of traditional barter with other parts of Ladakh.

Historically, livestock production was the major land use in the area, as the high altitude and aridity did not allow agricultural production. Nevertheless in the early 1970s, some nomads started cultivating barley and green pea. In the beginning, these crops consistently failed due to harsh climate and the short growing season with frequent early frosts. The crops that managed to survive could be used only for stall-feeding in winter. However, in recent years improved varieties with shorter growth periods were introduced by the Agricultural Department, Leh, and this has enabled cultivation for grain as well as livestock forage. Presently, most *Changpas* (almost 70%) in the Hanle Valley cultivate for food. Most of the people that practise agriculture are also involved in other commercial activities, such as running grocery shops in the villages.

Discussion

Livestock Population: Is the Growth Sustainable?

The livestock population is on the rise all over Changthang. It was estimated at *c.* 200,000 in 1999, which is twice that in the late 1970s (Richard, 1999; Bhatnagar and Wangchuk, 2001). The increase is most dramatic in case of goats, preferred by *Changpas* (Ahmed, 2004) presumably in response to the increasing demand for cashmere wool. In any case, this trend is consistent with that in other pastoral areas of Ladakh (Namgail *et al.*, 2006a) as well as the entire Hindukush-Himalayan Region (Tulachan, 2001). The increase in livestock population in Changthang began with the arrival of the TRs with their livestock in the early 1960s, as well as the loss of access to pastures across the Tibetan border (see Bhatnagar *et al.*, 2006b). This inflated the stocking density considerably. A further increase was facilitated by addressing two important issues that presumably had restricted the livestock population historically—the control of diseases and offsetting starvation mortality during extremes of winter. Livestock diseases such as foot-and-mouth, Peste des petits ruminants, echthyma and contagious caprine pleuro-pneumonia have been brought under control through frequent vaccination by the government (Anonymous, 2002). Medicines are provided to the pastoralists at 50–70% subsidy. The livestock are also protected from ecto-parasites as the government provides livestock dipping facilities. In addition, the seasonal movements of the *Changpas* are also restricted, albeit temporarily, by the para-military forces in areas close to the border. Thus, the unprecedented increase in livestock population may not be ecologically sustainable, especially in the wake of deteriorating pasture conditions.

The increase in the population of domestic sheep and goats poses threat to the survival of the Tibetan gazelle, which is on the verge of extinction in India, as only a small remnant population of less than 100 individuals graze alongside livestock in Hanle and the adjoining areas. Based on the distribution of faecal pellets, Bhatnagar *et al.*, (2006a) found a negative relationship between the abundance of gazelle and that of domestic sheep/goat, implying a competitive interaction between these wild and domestic ungulates. Studies on the food overlap between livestock and other gazelle species elsewhere in central Asia have also suggested a competitive interaction (e.g., Campoz-arceiz *et al.*, 2004). The livestock may not just reduce the forage availability to the gazelle, but may physically displace them from productive pastures, because herding dogs may prey on gazelles (see Namgail *et al.*, 2006b for a case study). The kiang, however, occur in relatively robust numbers, which could be attributed to their religious protection by the *Changpa*, who are Buddhists. But with changing socioeconomic circumstances, these religious sentiments are eroding (Yishe, herder, personal communication).

In traditionally agro-pastoral communities in the Trans-Himalaya, the ability to raise supplementary forage in crop-fields is one of the most important factors limiting livestock populations (Mishra *et al.*, 2003), and an important cause of overstocking of rangelands (Mishra *et al.*, 2001). In Changthang, supplementary emergency fodder supplies provided by the government during severe winters further help in reducing mortality. For example, during the winter of 2004–2005, *Changpa* in Hanle were provided *c.* 15 tons (*c.* 1 quintal/household—(1 quintal=100 kg)) of fodder to overcome the forage shortage due to heavy snowfall. The Border Area Development Programme of the Government of India further assists the *Changpa* in construction of godowns for cattle feed, kidding and lambing sheds, and in provisioning of vital equipment such as *Pashmina* combing tools. The TRs get similar material as well as financial assistance from the Tibetan Government in Exile and international organisations like Appropriate Technology for Tibetans (ApTibet). Heavy losses of livestock during severe winters are compensated, so that a minimal herd size required to support the family can be re-established. The Tibetan Government in Exile also confers loans to those in need, and provides cattle feed during severe winters.

Our data show that cashmere wool is an important source of income for the pastoralists of the Hanle Valley. We also found the per capita income of the TRs from cashmere to be higher than that of the *Changpa*. Such a discrepancy could be related to the latter's involvement in other commercial activities such as small business enterprises. Although the overall increase in livestock populations in the region may not be ecologically sustainable, cashmere production is likely to increase. Both the Govern-

ment of India and the Ladakh Autonomous Hill Development Council are making a concerted effort to increase the cashmere production in Changthang through provision of enhanced veterinary care, assured supply of feed for severe winters, and by providing improved livestock breeds.

Socioeconomic Changes

Traditional polyandry, which was perhaps a population control mechanism in the past, has come to be viewed as primitive by the younger generation of *Changpas*, who are increasingly opting for monogamous families (Ahmed, 2002). This has resulted in the formation of nuclear families, and thus an increase in the human as well as livestock populations. At the same time the reduced manpower per family is resulting in some families finding it difficult to sustain nomadism as a way of life, an observation also made in other parts of Changthang (Chaudhuri, 2000; Hagalia, 2004). However, pastoralists in Hanle are switching over to alternative sources of income that need less manpower, which is in contrast to the situation in Rupshu-Kharnak area, where people are moving to the urban centres such as Leh (Goodall, 2003). This discrepancy could be related to the extensive tourism activities and facilities in the Rupshu area. In Hanle, tourism is almost non-existent.

The border conflict with China led to a major influx of Indian Army personnel into the Changthang area. One of the major changes associated with this was the construction of a road-network, which made this previously remote area accessible, and enhanced the mobility of the *Changpa*. The replacement of yaks and horses by motor vehicles could be attributed to this infrastructure development. Certainly, market accessibility was enhanced, and *Changpas* began taking their produce, especially wool and cashmere, to the market themselves, thereby becoming less dependent on middlemen. The arrival of the Indian Army also provided local people with employment in military camps as cooks, helpers etc., as well as exposure to wider Indian culture.

The drastic increase in livestock population in the rangelands, together with increased opportunities, presumably prompted several *Changpa* families to look for alternative means of livelihood such as agriculture and small business enterprises (Khaldu village headman, personal communication). Barley is very important for *Tsampa*, the staple diet, and *Chhang*, a local brew, and its cultivation perhaps increased following the cessation of the traditional barter trade, which historically made this and other commodities available to the *Changpa*. The government's watershed development schemes in large areas (*c.* 120 ha) of the Hanle River Basin may also have promoted agricultural production. Increased agriculture has probably also impacted their movement patterns. For instance, during autumn, when more

manpower is needed for harvest, and stubble on agricultural fields is available for livestock, many nomads congregate near their villages. A similar trend is seen in late spring when ploughing and sowing requires more manpower.

Conclusions

The people of the Hanle Valley represent a unique pastoral community that has survived on the marginal rangelands of Changthang since the eighth century A.D. Today, their production system, land use, and socioeconomy are in flux. Such changes may have important implications for the long-term sustainability of pastoralism in Changthang. The livestock population, especially sheep and goats, is increasing, and may continue to increase apace due to increased demand for *Pashmina* wool and meat, while yak and horse populations may decline in the future as the nomads are increasingly using motor vehicles for transportation. However it should be noted that in the recent years many Ladakhi people are turning to a vegetarian diet, largely as a result of active campaigns by several religious organisations against slaughtering animals (T. Namgail, personal observation). Therefore the number of sheep, kept mostly for meat production may also decline. Such changes in livestock holding pattern and herd dynamics may affect the rangeland resources and ecosystem functioning. Although the region has a unique grazing pattern with pastures divided amongst different grazing groups, more innovative grazing schemes may be needed in future to cope with the high rate of increase in livestock population. The government's emphasis on *Pashmina* production needs to be reviewed. A detailed understanding of the rangeland dynamics of the region is crucial for developing conservation and developmental strategies that can achieve the goal of enhancing the livestock production without harming the ecosystem.

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