Short Communication

Decline of the Tibetan gazelle in Ladakh, India

Yash Veer Bhatnagar, Rinchen Wangchuk and Charudutt Mishra

Abstract The Tibetan gazelle *Procapra picticaudata* is endemic to the Tibetan plateau. In the Ladakh region of northern India its range declined from *c.* 20,000 km^2 in the early 1900s to *c.* 1,000 km^2 in the late 1980s. Here we report the results of our recent (1999–2003) assessments of the gazelle's conservation status in Ladakh. Range-wide surveys indicate that the present population of the Tibetan gazelle in Ladakh is *c.* 50, restricted to a range of *c.* 100 km^2. Populations in the Tso Kar basin and Dungti have gone extinct within the past decade. Throughout the last century hunting was the primary cause of the gazelle's decline. Although hunting has been brought under control in the last two decades, intensified livestock grazing appears to have prevented the gazelle's recovery and may be precipitating further declines. The species needs immediate, participatory conservation management, as well as a reassessment of its IUCN Red List status.

Keywords Antilopinae, declines, livestock, *Procapra picticaudata*, Tibetan gazelle, Trans-Himalaya.

The Tibetan gazelle *Procapra picticaudata* is endemic to the Tibetan plateau. Its historical distribution was wide, occurring across most of the Tibetan plateau from Sichuan and Gansu provinces in the east, Xinjiang province in the north, Greater Himalaya in the south, and the Changthang region of Ladakh in the west. The species inhabits open plains and mountain slopes, and relatively mesic sites on the otherwise arid Tibetan plateau. The ecology of the species remains poorly understood, with only two studies of its status and distribution in Tibet and preliminary observations on its diet (Harris & Miller, 1995; Schaller, 1998). Here we present the results of surveys of the species in the Ladakh region of India, and summarize the factors that have determined the gazelle's current precarious status and are likely to influence the prospects for its survival.

Within India the gazelle has been reported from eastern Ladakh and Sikkim (Fox *et al*., 1991; Shah, 1994). Eastern Ladakh is an extension of the Tibetan plateau and is characterized by high altitude plateaus ($>$4,200 m) and rolling slopes interspersed with lake basins. The vegetation includes open alpine steppe communities with *c.* 15% vegetation cover. Vegetation is usually dominated by grass, and biomass rarely exceeds 15 g m^{-2} (Schaller, 1998; data from adjoining sites in Tibet). The growth season is limited to June–September and temperature regularly falls to –30°C during the long winter.

The gazelle was relatively common during the early 20th century when it occurred over much of the *c.* 20,000 km^2 Changthang region in eastern Ladakh (Burrard, 1925; Stockley, 1936; Fig. 1). However, by the early 1980s excessive hunting had reduced this range to *c.* 1,000 km^2 (Fox *et al*., 1991). Although hunting was brought under control by the late 1980s, gazelle populations did not recover (Chundawat & Qureshi, 1999). The species is currently accorded the highest conservation status in Schedule I of the Indian Wildlife (Protection) Act 1972 (Anon, 1992). Its Red List status has been categorized as Critically Endangered within India (Anon, 1998).

In October 1999 and August 2000 we surveyed the entire historical range of the gazelle in Ladakh. We searched for gazelles from a slow moving vehicle (10–12 km h^{-1}) covering 1,232 km in eight blocks (Kharu-Changla, Changla-Tangtse, Parma Valley, Pongong Tso (south bank), Chushul-Tsagala-Loma, Loma-Demchok (Upper Indus), Loma-Rongo-Hanle (Khaldu), and Hanle – Kalang Tar Tar. In the non-motorable areas of Hanle *c.* 20 km was covered on foot. In all areas we interviewed local people about the past and current occurrence of the gazelle.

The survey confirmed the occurrence of the gazelle only in the Hanle Valley. Two populations reported

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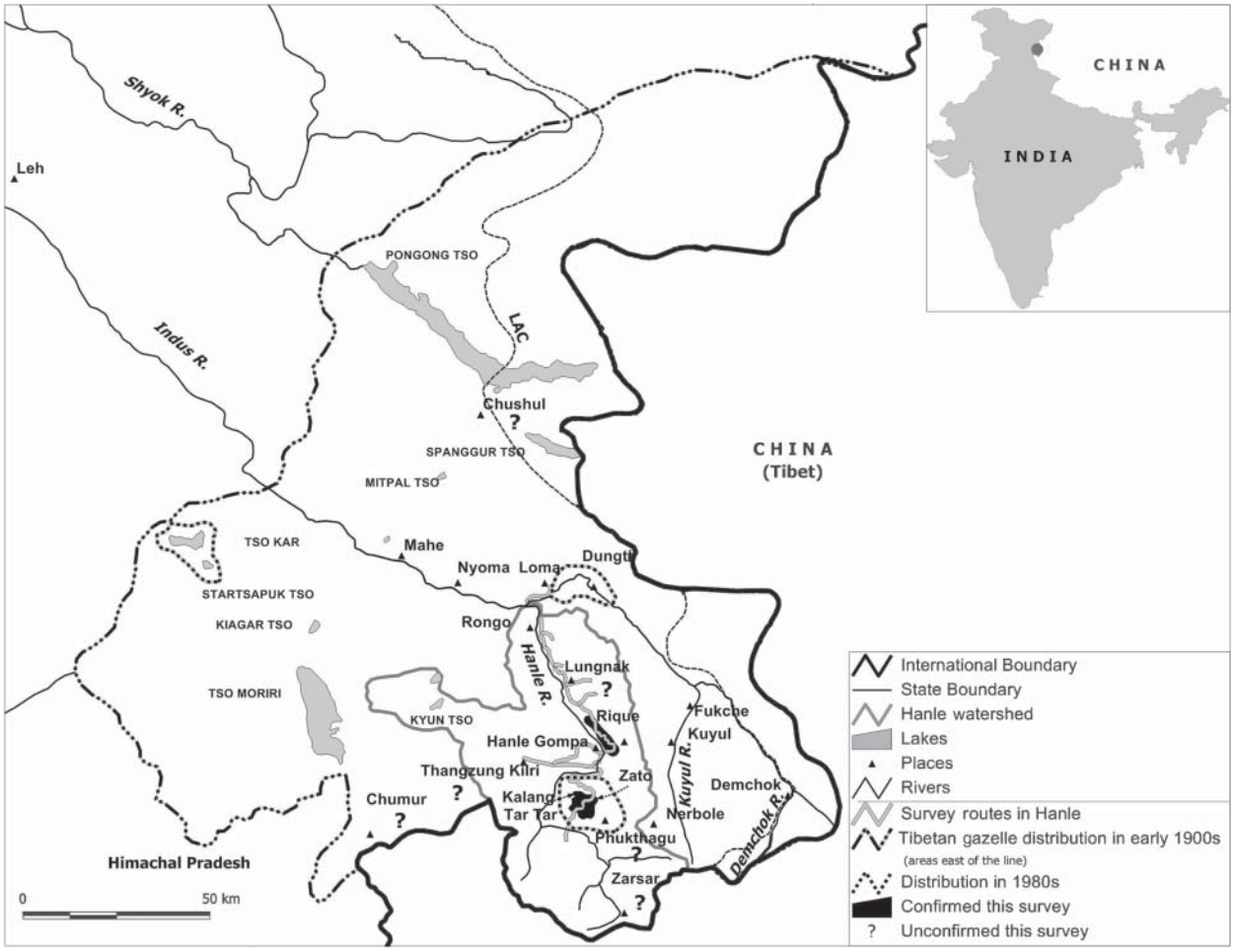

Fig. 1 Past distribution of the Tibetan gazelle in Ladakh and the present distribution in the Kalang Tar Tar (KTT)-Zato plateau and the Rique plains of the Hanle valley. The distribution in the early 1900s is deduced primarily from Burrard (1925) and Stockley (1936), and that in the 1980s is based on Ranjitsinh (1981) and Fox *et al*. (1991). The inset indicates the position of the main map on the border between India and China.

along the upper Indus valley near Dungti and Tso Kar (Fox *et al*., 1991; Shah, 1996) have gone extinct within the last decade. Enquiries with herders and army personnel suggested the presence of a hitherto unreported small population near Chumur and Chushul (Fig. 1), but this is unsubstantiated.

We made observations of the gazelle population in Hanle Valley (*c*. 2,800 km^2; Fig. 1) in the late winters (April) of 2001 and 2003. The valley has six permanent settlements, inhabited by the original pastoral *Changpa* and those from Tibet who came as refugees since the 1960s. The total livestock population in the valley (mainly goats and sheep) is *c*. 30,000 (Sheep Husbandry Department, Nyoma, unpub. data, 2001). We searched for gazelles from a slow moving vehicle between Rongo and Kalang Tar Tar (Fig. 1). The main and adjoining valleys along the Hanle River were scanned, covering a distance of *c.* 100 km. We also conducted *c*. 95 km of foot surveys in Kalang Tar Tar-Zato and between the Lungnak Lungpa and the Hanle Gompa, the two areas where we confirmed the gazelle's presence during the earlier survey. In addition to direct sightings, we recorded gazelle dung and latrine sites as an index of their abundance along 71 transects (30 * 2 m), where we also enumerated livestock dung. Gazelle dung (average length $\pm$ SE 9.4 $\pm$ 1.7 mm) is smaller than adult sheep-goat dung (13.7 $\pm$ 1.8 mm) and was thus easily discernable (Y.V. Bhatnagar, unpubl. data), and because domestic lambs and kids are grazed by herders separately near camp sites there was no confusion between livestock and gazelle dung. Interviews with *c*. 50 herders yielded further information on gazelle occurrence and about livestock holdings and movement patterns.

We estimate the gazelle population in Kalang Tar Tar to be *c*. 30 based on our sightings (a maximum of 17 individuals in four groups seen during April 2003) and

interviews with local herders. These individuals are restricted to an area of *c.* 20 km^2 in the upper part of the plateau. This is presently the single largest population of the gazelle in Ladakh. Extensive searches in adjoining areas, covering 5–10 km in all directions, yielded no sightings, although we did record old dung in the Phuktagu area (Fig. 1).

On the Rique plains we sighted a maximum of six gazelles (two males, two females and two young) during the 2001 survey. Herders believed this constituted the entire gazelle population in the area. In 2003 we located only five individuals. In contrast to the relatively well vegetated (25–35% plant cover) Kalang Tar Tar, this flat valley at 4,300–4,500 m is a stony desert with sparse plant cover (8%). According to herders these gazelles colonized the area from Kalang Tar Tar after a severe winter in 1998–99. The herders also reported a small population (3–4) near Zarsar and in Thangzung Kilri until *c.* 5 years ago (Fig. 1) that they now believed to be extinct.

Our estimate is that *c.* 40 Tibetan gazelle survive in the Hanle valley over an area of 50–80 km^2 of Kalang Tar Tar and the Rique plains. Thus, including the possibility that there are some individuals in Chushul and Chumur, our estimate of the present gazelle population in Ladakh is *c.* 50 over a range of <100 km^2. Entire populations have been lost and others are declining. The Kalang Tar Tar population, for example, numbered at least 68 in 1997 (Pfister, 2004), and at least 36 in 1998 (Chundawat & Qureshi, 1999).

Across the Tibetan plateau the species occurs patchily at very low densities (Schaller, 1998). It is reported to feed on forbs and some dwarf shrubs and sedges; life-forms that are patchily distributed in the grass-dominated Tibetan plateau (Schaller, 1998). Thus, the species may be naturally restricted in distribution and abundance.

Despite its inherently low density the species was commonly hunted throughout the 20th century (Mallon & Kingswood, 2001). Even early authors (Burrard, 1925) commented on the decline of the gazelle in Ladakh due to excessive hunting. During the 1960s large contingents of the Indian Army and paramilitary forces moved into eastern Ladakh and, according to the elders in the herding communities, the gazelle was commonly hunted by the army as the animals could be easily approached in vehicles. Hunting pressure possibly escalated with the influx of Tibetan refugees, some of whom admitted hunting gazelles in the past.

Our own observations, interviews with herders, and talks with officials of Ladakh's Wildlife Department, suggest that hunting has been uncommon since the 1980s due to the implementation, and also awareness of, conservation laws. The gazelle populations have, however, continued to decline. Small populations are known to be more vulnerable to extinction (Soulé, 1987; Korn, 1994), and livestock grazing may have played a significant role in preventing the recovery of the species in Ladakh. Our data from dung transects in Hanle suggest a possible negative correlation between the abundance of livestock and gazelles (Spearman's $R^2 = 0.67$, $P = 0.08$). The Kalang Tar Tar area, with the largest remaining gazelle population in Ladakh, is a region of relatively low livestock grazing, as it forms the upper fringe of the spring pastures for local livestock, and is *c.* 10 km from the summer pastures. Similarly, on the Rique plains the small population of gazelle is restricted to a narrow patch that is relatively free from livestock grazing due to local herding practices.

Across Ladakh the livestock population has doubled in the last 30 years (Bhatnagar & Wangchuk, 2001), although data are not available specifically for eastern Ladakh. The number of families rearing livestock increased with the influx of Tibetan refugees and because of the breakdown of the herders' traditional polyandrous system (Headman of Khaldu village, pers. comm., 2001; Hagalia, 2004). Rearing of the *pashmina* goat for its valuable wool has also been significantly promoted in eastern Ladakh, and has included the provision of supplemental feed (Bhatnagar & Wangchuk, 2001). In addition, the loss of many traditional pastures due to border disputes with China (e.g. Skagzung in the upper Indus) has intensified the grazing pressures in eastern Ladakh (Phuntsok, 2000; Hegalia, 2004). In summary, as in the case of other Trans-Himalayan mountain ungulates (Mishra *et al.*, 2004; Bagchi *et al.*, 2004) it appears that resource competition with livestock, and other collateral effects of livestock grazing, have prevented the recovery of the Tibetan gazelle.

The Tibetan gazelle is on the brink of local extinction in Ladakh. Conservation efforts to stabilize and increase its population are required with livestock-free areas created in and around the gazelle's existing range by providing incentives to the herding community (Mishra *et al.*, 2003). In the longer term, reintroduction plans need to be devised for areas such as the Tso Kar basin, after reducing pressures there and restoring the habitat.

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Biographical sketches

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