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Some information on the ecology of Khulan (*Equus hemionus* Pallas, 1775) in the western part of the South Gobi province, Mongolia

D. Tsendjav & S. Purevsuren

Abstract

This short study provides information on the density and distribution of khulans in September 2003 and speculates about factors that negatively influence the khulan population in the sums of Khurmen, Bayandalai, Noyon, Sevrei, and Gurvantes in the South Gobi province.

Key words: khulan; *Equus hemionus* Pallas, 1775; population numbers: density; ecology: domestic livestock

Introduction

There is a large body of literature about population estimates and density of khulan (*Equus hemionus* Pallas, 1775) for the South Gobi. MUNKHSAIKHAN et al. (1986) counted 11,300 khulans in the South Gobi and East Gobi. In 1999 the MONRIEL company recorded 13,513 khulans in an area of 7,080 km² in the South gobi. In the Gobi Gurvan Saikhan National Park's area near the Khongor river AMGALAN et al. (2000) counted 99 khulans in an area of 4,900 km², accounting for an average density of 0.2 khulans per 1,000 ha. READING et al. (2001) came up with a number of 28,000 khulans in the area between Sainshand and Dalanzadgad in the southeastern Gobi of Mongolia.

In the Gobi Baga National Park and the sums of Nomgon, Bayan-Uvuu, Khanbogd, South Gobi province and the sum of Khatanbulag, Dornogobi province, ENKHBILEG et al. (2002) counted 2 khulans per 1,000 ha and estimated the total population in this area at 12,400 - 20,200 animals. It is generally assumed that ~ 50% of the khulan population of Mongolia are found in this area (AMGALANBAATAR 1997).

In the sums of Khurmen, Noyon and Bayandalai, khulans were mainly observed in areas such as Ikh Argalant, western Bugtii, eastern Bugtii, Elgen mountain, and Atgar mountain. In the sums of Sevrei and Gurvantes khulans were mainly present in Zuramtai, Dov zag, Noyon, Sevrei mountain, Khuren Khana mountain, mountains Tost, Sevrei and Nemegt, Bajuun, Choniin boom, Zulganai, Alman mountain, Gural's valley, Khar Dovon, Khuduu Khongor, Alag tsav, dunes of Khongoriin els (BANNIKOV 1954, DULAMT SEREN 1970, SOKOLOV & ORLOV 1980). However, until now only very little data is available from the western part of South Gobi province.

Study area

We surveyed the Khulan population in an area of 13,565 km² which covers roughly 60% of the estimated Khulan range in the western part of the South Gobi province. The 5 western sums (fig. 1) our study was focused on, are inhabited by 3,066 households with a total of 11,702 inhabitants that own around 132,000 livestock. In the study area khulans live intermingled with livestock and use the same pastures and water points. Domestic sheep and goat graze in the surroundings of their owners' homes and are usually watered by hand from nearby wells. In addition to small livestock, about 7,000 domestic camels and 18,000 domestic horses range rather unrestrained in the same area as the khulans and competition can be expected to occur.

Pastures are dominated by *Stipa gobica*, *Stipa glareosa*, *Cleistogenes songorica*, *Allium polyrrhizum* and *Anabasis brevifolia*. The soil is soft, occasionally muddy after rains and sandy brown, and the topography is a combination of small hills and valleys. In the drier areas, desert

steppes are dominated by *Artemisia sphaerocephala*, *Eurotia ceratoides*, *Halogeton arachnoideus*, *H. glomeratus* and saxaul forests (*Haloxylon ammodendron*). Saxaul stands are often intermingled with other shrubs like *Salsola passerina*, *S. arbuscula*, *S. rosacea*, *Reaumuria soongorica*, *Tamarix elongata*, *Tamarix gracilis*, *T. ramosissima*, *Nitraria sphaerocarpa*, *Ephedra sinica*, *E. monosperma*, *E. equisetina*.

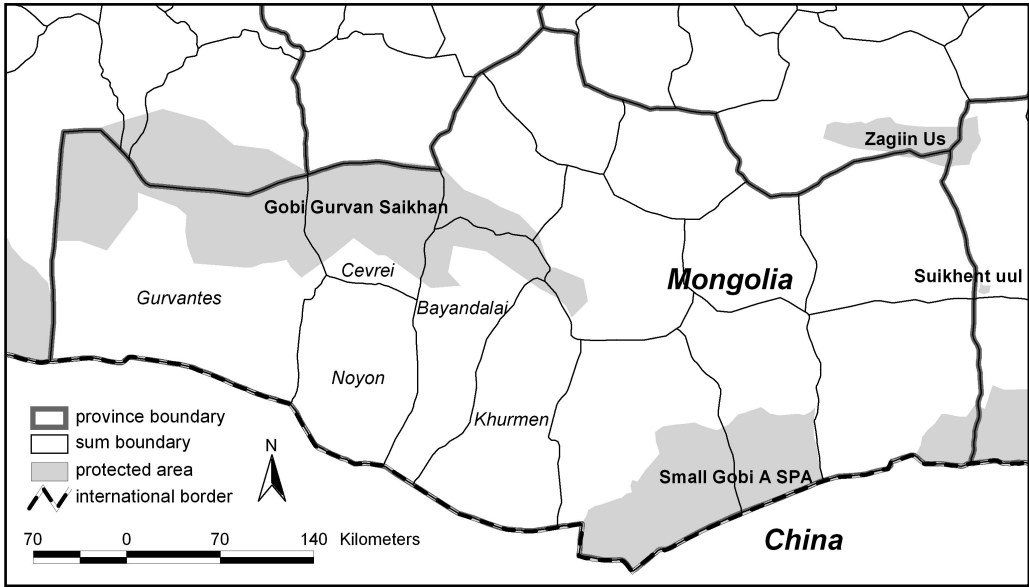


Fig. 1: Study area: the five western sums of the South Gobi province.

Material and Methods

The khulan population was surveyed using methods aproved by the Mongolian Academy of Science on the 19th of July 2002 (also see ENKHBILEG et al. 2007 this volume). During our field trip in September 2003 we used a hand-held GPS unit (Garmin-ETrex), a compass, binoculars (Nikon and Pentax 10 x 52) and a telescope (Bushnell 15 x 45). Included in our analysis were over 200 point locations as well as one continous transect. Locations and tracks were visualized in a GIS (ArcView 3.1, ESRI).

We estimated Khulan densities using the following formulas:

$$S_1 = L \times Wa \quad \text{with:} \quad \begin{array}{ll} S_1 & = \text{total area surveyed} \\ L & = \text{length of transect} \\ Wa & = \text{width of transect (assumed to be 5 km)} \end{array}$$

$$Nt = Ns \times Nd / S_1 \quad \begin{array}{ll} Nt & = \text{total population size} \\ Ns & = \text{estimated total population range} \\ Nd & = \text{number of khulans counted} \end{array}$$

Results and discussion

Distribution of khulan

During our survey in September 2003 we counted a total of 331 khulans in 36 goups (table 1, fig. 2). We located khulans in Dov zag, Embuu teeg, Zeergen mountain, and Atgar (Bayandalai sum) and in the saxaul forest around Tuvshin mountain (Sevrei sum). Whereas over the last two years over 100 khulans were located in the area of Dush's toirom, Ulaan Khuree (Khurmen and Bayandalai sums; Baraaduuz pers. comm.), in September 2003 this area had no vegetation and

only dry water points. Nevertheless, we recorded 8 khulans in two areas where we also noticed fresh feces and tracks. To the west and north of these areas, around Durvun mod of Atgar mountain, we found rich vegetation with a high percentage of grasses in an area of 35 x 15 km (525 km²). Here, we were able to observe 28 khulans, including 4 foals and 2 yearlings. A further 5 khulans were recorded in the valley of Zeergene where the vegetation was also quite good.

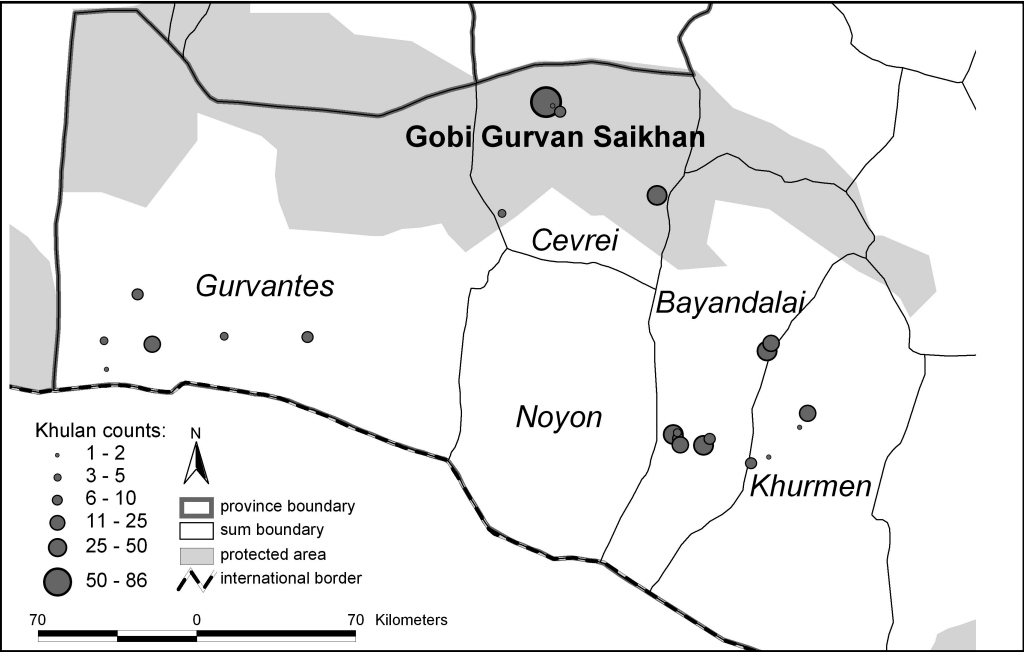


Fig. 2: Khulan observations in the five western sums of the South Gobi province.

Herd structure

Of the 36 khulan groups encountered, most came in groups of 1-10 animals (fig. 3). The number of foals or yearlings was low with only 8.5% foals and 2.8% yearlings (fig. 4).

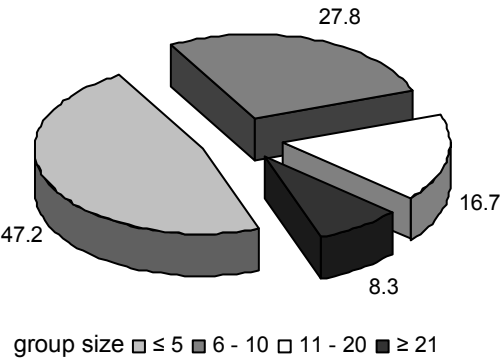


Fig. 3: Percentage of different sized groups for 36 khulan groups encountered in the western part of South Gobi.

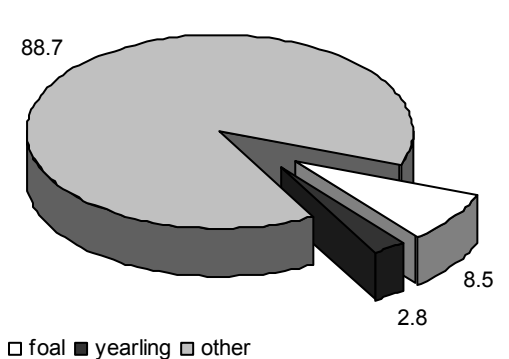


Fig. 4: Percentage of young animals in 36 khulan groups encountered in the western part of the South Gobi.

Most single animals seemed to be young males expelled from a family group or old stallions expelled from young all-stallion groups. Male groups were never accompanied by yearlings or foals. However, none of the mixed groups encountered in the sums of Khurmen, Noyon and Gurvantes sums had any foals or yearlings. Only in the sums of Bayandalai and Sevrei did we see any groups with foals or yearlings at all. This is an indication for a low reproduction rate in 2003.

Table 1: Distribution of khulan encountered in the western sums of the South Gobi province in September 2003

Location (GPS)		Site name	Khulans counted		
Lat	Long		all	young	foal
		<u>Khurmen sum</u>			
42.82293	103.76522	Janjin. Bosgot's backside	11		
42.76294	103.72854	Janjin. Bosgot's well	1		
		<u>Noyon sum</u>			
42.59973	103.47846	Sairan. Dush's moirom	6		
42.63127	103.57256	Sairan. Ulaan khuree	2		
		<u>Bayandalai sum</u>			
43.06107	103.50963	Dov zag	33	3	8
43.09333	103.52879	Bayan. Embuu teeg	18		
42.68747	103.03417	Naran. Zeergene mountain	31	1	5
42.67210	103.06375	Naran. Zeergene mountain	6		
42.64785	103.07833	Naran. Zeergene mountain	24	2	4
42.65510	103.20572	Naran. Atgar's front side	28	2	4
42.68381	103.23799	Naran. Atgar's front side	6	1	2
42.69633	103.05704	Naran. Zeergent	5		
		<u>Sevrei sum</u>			
43.65053	102.81647	Dukhum	27		4
43.51194	101.96269	Sain-shand. Uizen shand	5		
43.98004	102.13930	Sain-shand. Tuvshin mountain	86		8
43.96798	102.17990	Sain-shand. Tuvshin mountain	1		
43.94735	102.22502	Sain-shand. Tuvshin mountain	6		
		<u>Gurvantes sum</u>			
42.92110	100.96542	Morin zag	6	1	
42.88325	100.50675	Gelengin us	4		
42.81355	100.11752	Bajuuni aarag	13		
42.80283	99.85207	Bajuuni zyyn uzuur	5		
42.68950	99.88540	Bajuun's backside	1		
43.00617	100.00207	Alag mountain	6		
		Total	331	10	35

Factors negatively affecting the Khulan population

Weather & pasture condition

Surprisingly in the groups with young animals, the number of yearlings was 3 times less than the number of foals. The most likely explanation are the adverse weather conditions (very dry) in the summer of 2001. Khulans were mostly too weak to breed, or mares did not conceive or lost embryos early in the pregnancy, resulting in very low numbers of foals born in 2002 and thus low yearling numbers in 2003.

When there is no new vegetation and good fodder, skinny mares will have weak and ill newborns. A newborn foal depends on its mother's milk for over 2 months. A foal can only grow normal and built up enough fat reserves if its mother is in good body condition. If the pasture is poor, mares are also in poor shape and have to move over large distances in search of pastures. This puts a further constraint on survival of weak foals and results in high mortality levels. If the observed low percentage of young animals in the population will persist, e.g. due to repeatedly adverse weather conditions, the khulan population will decrease and the animals may vanish from certain areas.

Access to open water

Besides pasture quality, access to open water is the second most important habitat requirement for khulans, especially in spring and autumn. Only in summer, when plants have a high moisture content, khulans may be able to live without drinking water for 2 -3 days. However, in autumn and spring when the vegetation is brown and dry, khulans need to drink daily.

Before the 1990s, when herders had ample access to well maintained wells, khulans used to drink at open waters largely unaffected from human or livestock presence. Nowadays, most open water points, where khulans used to drink or still drink, such as Dushin bulag (Khurmen sum), Sukhain bulag, Tsagaan gol, and Durvun mod (Bayandalai sum), Uver zadgai (Noyon sum), Khutul bulag, Goyot bulag, Ekhen goyot, Jargalant bulag (Sevrei sum) and Khurshuut, Khovkhon bulag, Zulganai, Narandaats (Gurvantes sum), are occupied by herders and their livestock. Limitation access to water negatively affects khulans, especially in autumn.

Impact of humans and their livestock

Before 1990's livestock was state-owned and pasture use was strictly regulated. With the privatization in the 1990's, the number of livestock breeders, livestock and the intensity of pasture use increased sharply. These changes also affect the khulan's habitat.

Although khulan are protected by laws in Mongolia and are listed in the Mongolian Red Book, they are (1) displaced from their natural habitats due to competition with livestock, (2) chased away by people with cars with groups being scattered and (3) are hunted by poachers and some of the meat is sold on black markets. All these factors negatively influence the Khulan population and keep numbers at a low level in the Gobi areas of Mongolia (see also STUBBE et al. 2005).

Livestock statistics and our own observations show that there are many horses and camels in the sums of Khurmen and Noyon, but only few khulans. In the sums of Bayandalai, Sevrei and Gurvantes, where numbers of horses and camels and horses numbers are lower, more khulans are found. We believe this clearly shows that the presence of people and their livestock - cattle, camels, horses, sheep and goats - is displacing khulans from pastures and water points (see also fig. 5).

In September 2003 we also counted khulans in other parts of the Gobi. Spring and fall are the times when khulans are believed to aggregate in large groups and cover large distances during their seasonal migrations. In sharp contrast to our study area in the western part of the South Gobi province, we encountered several large herds of khulans in the SE Gobi: 2,500 khulans in

Ergelin zoon (Khatanbulag sum), 2,400 khulans in Khulgar gun sukhai, and 2,700 khulans in Murguud (Mandakh sum; LHAGVASUREN et al. 2003). Only 3 months later, the same team encountered just few khulans in the same area: 2 groups of 21 khulans in Ergelin zoon and 25 - 50 khulans in the sum of Mandakh, demonstrating how highly variable khulan distributions are (LHAGVASUREN et al. 2004).

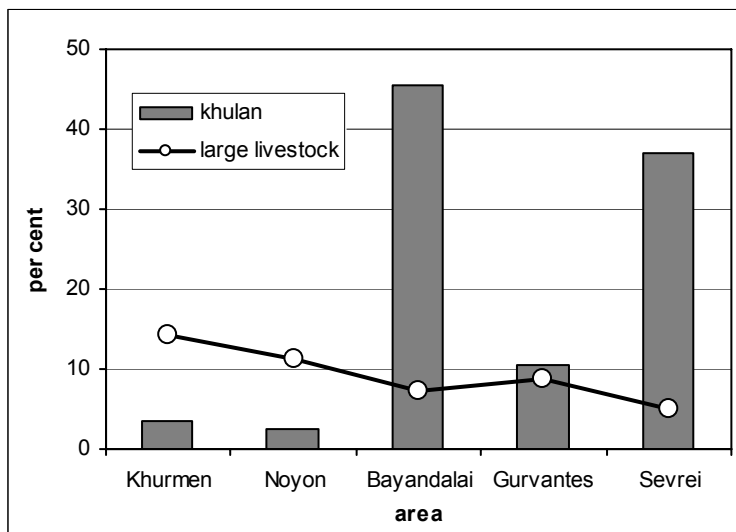


Fig. 5: Large livestock (cattles, camels and horse in % of total livestock) and Khulan's occurrence (in % of all counted) on the sum territories in the western part of South Gobi province. Khulans avoid regions with higher percentage of large livestock.

Wolf predation

A further risk for Khulan survival may be the number of wolves in an area. Many people believe that the number of wolves hunting khulan foals has increased in the past years and that this predator can restrict khulan numbers or influence group composition (FEH et al. 1994).

Conclusion

Based on our observations we believe that in the western sums of the South Gobi Aymag, population number and density of khulan are dependent on pasture and water availability, as well as on the distribution of humans and their domestic livestock. We believe there are about 22,516 km² of suitable habitat. Combining all Khulan observations (point and transect counts), we come up with an average density of about 0.24 kulans per 1000 ha. Although the Khulan is a protected species, adverse weather conditions and direct and indirect human influences seem to affect the khulan population negatively and keep population numbers at a low level.

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