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Population assessment of khulan (*Equus hemionus*) in Mongolia

B. Lkhagvasuren

Abstract

The here presented data suggest that 18,411 (± 224) khulan inhabit southern Mongolia with a density of 1.4 individuals per 1000 km² within the 157,525 km² territory of its actual distribution. The Dornogobi province contains the highest number of Khulan with a mere 67 %, while 20 % are found in the Ömnögobi province, 12 % are in Djungarian Gobi and only 1 % in the Gobi-Altay and Bayankhongor provinces. According to the proportion of foals and yearlings within each aimag, the Dornogobi, Ömnögobi east and Khovd populations have an average reproduction rate.

Key words: khulan, *Equus hemionus*, Mongolia, population, conservation

Introduction

Mongolia represents one of the last strongholds of the Asiatic wild asses *Equus hemionus*, a species with a wide distribution range which inhabits the Middle East (*E. h. onager*), Middle Asia (*E. h. kulan*), parts of India (*E. h. khur*), and the Gobi desert of China and Mongolia (READING et al. 2001). The khulan is listed under CITES Appendix II and in CMS Appendix II (2002); it is protected as 'Rare' under the Mongolian Law on Fauna 2000, and hunting is prohibited since 1953. The Mongolian Hunting Law (2000) recognises the species as 'Rare', and it is included the "Mongolian Red Book" of 1987 and 1997. Most recently its status within Mongolia has been upgraded and listed as "Endangered, A4abd" in the "Mongolian Red List of Mammals" (CLARK et al. 2006).

The Asiatic wild ass is distributed in Mongolia throughout the Gobi including the southern parts of Gobi-Altay, Bayankhongor, Khovd and Dundgobi provinces, as well as the southern and eastern Ömnögobi province and the southern and western Dornogobi provinces (READING et al., 2001); recent surveys suggest that the species may be expanding into its former range within this region (MIX et al. 1995, cited in READING et al. 2001). There are several studies offering population estimates of the khulan population within the Mongolian territory, suggesting numbers to be as low as 4,000 individuals (SOKOLOV et al. 1978) up to a maximum of 33,367-62,902 animals (READING et al. 2001).

Historically khulan are competing on pasture and water sources with nomads and their livestock in the Gobi region of Mongolia. This problem became more severe after privatization of the livestock in Mongolia from the 1990ies onwards, when the socialistic-centralized economy was transformed into a free market economy. Increasing livestock numbers, especially in the Gobi region, and effects of so called "global warming" with a decrease of open water sources, desertification and degradation of pastures modified the rangelands even further, and local people started to blame the khulan and other wild herbivores (Mongolian gazelle, goitered gazelle) as grazing competitors. In order to take these problems into account and to find appropriate solutions, the Mongolian Parliament addressed the Institute of Biology (MAS) in 2003 to perform a national assessment of khulan populations in Mongolia and make recommendations regarding both the conservation and the sustainable use of this species.

The Institute of Biology - in co-operation with Ministry of Nature and Environment - implemented a population assessment of the khulan population in Mongolia from September 12 to September 23, 2003. The study was done by 7 teams, which included local protected area's inspectors, experts, herdsmen and border guards.

Study area and methods

The study areas were the eastern, southern and western part of the Dornogobi and Ömnögobi provinces, the southern ranges of the Bayankhongor, Gobi-Altay and Khovd provinces. The flora and fauna contains typical species of the arid regions of Central Asia. The region represents a high upland (c. 1000 m) with dry streambeds and hummocks, rocky outcrops, and mountain massifs are rising up to 200 m above the surrounding landscape. Springs and other water sources are rare. The climate is strongly continental and arid, characterized by cold winters (to - 35 °C), dry windy springs (to 5 m/s), and hot summers (to 40 °C). Precipitation in the Gobi is low and mainly restricted to the summer; for example does the Great Gobi region B gain an average of 100 mm/year, some, 127 mm/year may fall in the Ömnögobi province, and a mere 116 mm/year in the Dornogobi province (READING et al. 2001).

The vegetation is sparse, especially in the southern regions, and generally increases towards the north. Fine-leaved grasses and *Allium* dominate vegetation of the Gobi-steppe. Dominant plants include *Stipa klemenzii*, *S. gobica*, *Salsola passerina*, *Thymus gobica*, *Cleistogenes squarrosa*, *Ajania fruticulosa*, *Artemisia frigida*, and *A. rutifolia*. The semi-desert regions are characterized by semi-shrubs, shrubs, and some few grasses, including *A. fruticulosa*, *S. gobica*, *S. glareosa*, *Caragana korshinskii*, *C. pygmaea*, *Scorzonera capito*, *Lagochilus ilicifolius*, *A. frigida*, and *Haloxylon ammodendron*. The true Gobi desert contains only sparse vegetation, which is dominated by semi-shrubs, shrubs, and scrubs, including *Zygophyllum xanthoxylon*, *S. passerina*, *Anabasis brevifolia*, *Caragana leucophloea*, and *H. ammodendron*. Oases support the most luxurious vegetation in the region, and are dominated by *Phragmites communis*, *Juncus* spp. and *Achnatherum splendens* (READING et al. 2001).

Field methods

We used ground transects in each aymag; two transects were done in the Dornogobi and Ömnögobi regions, and one transect was performed in each of the Bayankhongor, Khovd and Gobi-Altay aymags respectively.

The width between transects depended on landscape characteristics and was varying from 20 to 60 km. Distance to the observed animals ranged between 100 m to 3 km.

Each team had at least one observer on each side of the car equipped with a binocular, spotting scope, GPS and photo camera. The larger herds of Khulan (more than 50 animals) were observed from point observations, i.e. observing animals from outside of the car in order to avoid disturbance of these herds. We attempted to note angles, distances and wherever possible the sex ratio and age structure of the observed animal groups.

Local herders were questioned about the status of Khulan status in their surrounding area, competition with livestock on both pastures and available water and possible future conservation priorities of this species. In total 75 people were interviewed, 37 of them were herdsman, 17 were officials from aymag and sum centers, and 20 border guards.

Data analyses

The following conditions and equations were used to determine the population size of khulan:

Mean distance to an animal:
$$W_1 = \frac{(w_1 + w_2 + \dots w_n)}{N},$$

with: W_1 - mean width to the herd/animal

$w_{1,2}$ - perpendicular distance to animal/herd, n - total number of animals.

501 - 1000 m, 1001 - 1500 m etc. intervals were used to determine the mean width.

Square calculations:

$$S_1 = L \cdot W_a,$$

Density is estimated per 10 km²: $Nt = \frac{N_s \cdot N_d}{S_1}$ and/or $Nt = \frac{N_s \cdot N_d}{LW_a}$

with: S_1 = total area surveyed
 L = length of transect
 W_a = width of transect (assumed to be 5 km)
 Nt = total population size
 N_s = estimated total population range
 N_d = number of khulans counted

Results

In the Dornogobi province a total of 72 herds consisting 9,400 khulans was encountered; 16.8 % of them were foals. The main concentrations were around Ergeliin Dzoo, Khulgar Gun, Tugrug Gobi within the Khatanbulag sum, Murguu, Guateeg in the Mandakh sum, which is situated in the south-western part of the aymag. Population estimations in this province showed that $12,465 \pm 620$ khulans occupied a territory of 59,755 km² with a density of 3.27 individuals/1000 ha; this was the highest density within the Khulan range in Mongolia.

In the western site of the Ömnögobi province's 36 herds with 331 individuals were observed; 8.5 % of these were foals and 2.8 % yearlings; thus a mere 550 ± 120 individuals roamed in a territory of 22,516 km² with a density of 0.24 individuals/1000 ha. However, in the eastern side of the Ömnögobi region some 2,822 khulans were counted, 5 % of them were males, 46 % females, 4 % yearlings, and 45 % foals. Hence does the Khulan's range in the Ömnögobi's region contain a territory of 63,946 km², which is occupied by $4,872 \pm 460$ khulans with a density of 0.64 animals/1000 ha.

In the Bayankhongor province were counted 18 herds with 47 khulans; 8.5 % were foals. The Khulan range had a size of 41,538.4 km² big territory of khulan range is occupied by 220 ± 50 individuals with a density of 0.05 animals/1000 ha.

18 herds were encountered in the Khovd and Gobi-Altay provinces, altogether yielding 1,630 animals, out of which 29.5 % were males, 47.5 % females, and 22.9 % foals; all these were occupying a territory of 12,324 km². The population estimation shows that $2,095 \pm 420$ animals with a density of 1.7 animals/1.000 ha inhabit this region.

The estimated reproduction rate (by percentage of foals) for each aymag was:

- Dornogobi - 40.8 %,
- Ömnögobi East - 45 %, West - 8.5%,
- Trans-Altay Gobi - 8.5 %,
- Dzungarian Gobi - 22.9 %, respectively.

Table 1: Overview of the khulan counting in southern Mongolia

province	study area (km ²)	khulan distribution area (km ²)	observed number of khulans	estimated khulan population number	density (per 1000 ha)
Dornogobi	45000	59755	9400	12465 ± 620	3.27
Ömnogobi	54180	63946	3153	3721 ± 160	0.50
Gobi-Altay and Bayankhongor	15000	41538.4	47	130 ± 8	0.03
Khovd	9200	12324	1630	2095 ± 110	1.70
Total	123380	177563.4	14230	18411	1.40

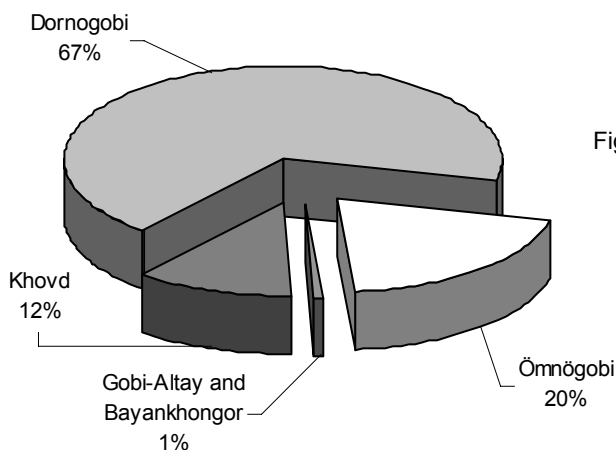


Fig. 1: Khulan distribution in Mongolia in the observed provinces (percentage).

Recommendations

- There is an urgent need to repair the broken wells and thus offer the herdsmen an alternative to the few open water sources; thus a competition on water resources between the khulans and domestic livestock will be minimized.
- Detailed research and investigations on pasture competition of Khulan with livestock are required.
- A National Management and an Action Plan for Khulan conservation supported by the Mongolian Government are needed.
- Monitoring and systematically research and further assessments of the Khulan population trends are required.
- Professional wildlife biologists are needed in all protected areas to perform a monitoring and research on both khulan ecology and biology.
- Taxonomy of the Khulan must be clarified for further international awareness.
- Possible re-introduction sites in the Great Lakes basin and the eastern side of the railway may be considered.
- Effective activities against poaching involving local people should be undertaken.

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