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Identification of herder-wild equid conflicts in the Great Gobi B Strictly Protected Area in SW Mongolia

Abstract

In protected areas of Mongolian overgrazing, competition with wild ungulates and poaching are important management concerns. The Great Gobi B Strictly Protected Area (SPA) in SW Mongolia is a re-introduction site for the Przewalski's horse (*Equus ferus przewalskii*), a stronghold of the Asiatic wild ass (*Equus hemionus*), and remains an important grazing area for semi-nomadic herders. We show the power of simple inventory and monitoring methods to assess herder-wildlife conflicts, by combining data of: (1) human and livestock demographic data, (2) migration patterns, of semi-nomadic herders, (3) monthly surveys of wild- and domestic ungulates, and (4) observations of re-introduced, free-ranging Przewalski's horses. A total of 111 semi-nomadic families with 57,657 head of livestock use the park, mainly in winter. Grazing impact of small stock affects 33 % of the park area and is virtually absent in the core area. However, due to the unequal distribution of open water, livestock is present at almost all water points. Seasonal wild horse and wild ass distribution seems to be positively linked to water availability and negatively to herder presence. We documented several cases of wild ungulate poaching, but the magnitude of the problem remains unknown. There are still many knowledge gaps and local people need to be more actively involvement in park management. As this is a rather new approach in Mongolia, we suggest park management to move towards adaptive co-management, accompanied by simple, but sound monitoring and evaluation schemes.

Key words: Asiatic wild ass, *Equus hemionus*, *Equus ferus przewalskii*, Great Gobi B SPA, livestock, Mongolia, Przewalski's horse

1. Introduction

Numbers and distribution range of most wild equid species have undergone a dramatic shrinkage worldwide (Moehlman 2002). Of the two Asian wild equid species, the Przewalski's horse (*Equus ferus przewalskii*) became extinct in the wild and the Asiatic wild ass (*Equus hemionus* and *Equus kiang*) disappeared from most of its historic range (FEH et al. 2002). The gobi areas of Mongolia are presently the only place in Asia, where Przewalski's horses have been re-introduced into the wild (VAN DIERENDONCK et al. 1996, SLOTTA-BACHMAYR et al. 2004) and where at the same time a large and more or less continuous wild ass populations exists (READING et al. 2001, MONGOLIAN MINISTRY OF NATURE AND ENVIRONMENT 2003, KACZENSKY & GANBAATAR unpubl. data).

The last recorded sightings of the Przewalski's horse occurred on the territory of today's Great Gobi B Strictly Protected Area (SPA) in the 1960s. Although the Przewalski's horse went extinct in the wild, the species survived due to a carefully designed captive breeding program (WAKEFIELD et al. 2002). With the success of the captive breeding program came the objective to produce animals for reintroduction in the wild and one of the selected sites was the Great Gobi B SPA (MONGOLIAN TAKHI STRATEGY AND PLAN WORK GROUP 1993, SLOTTA-BACHMAYR et al. 2004, WAKEFIELD et al. 2002). Between 1992 and 2004, 89 zoo-born Przewalski's horses were transported on 10 occasions to Takhin Tal at the north-eastern corner of the Great Gobi B SPA. Each Przewalski's horse transport was enthusiastically welcomed and celebrated by the local people (SCHIJEE 2005). As of December 2004, there are 65 free-ranging Przewalski's horses in 5 groups and an additional 27 animals in the adaptation enclosures (KACZENSKY & WALZER 2004a).

The Przewalski's horse is perceived as the wild relative of the domestic horse and is of high cultural and spiritual importance for Mongolians (OCHIRBAL 2002). However, the eradication of the Przewalski's horse in the wild resulted from a combination of factors, all of which were human related. Competition with domestic stock pushed wild horses into the marginal desert-steppe habitats and direct persecution disrupted herd structure and eventually caused unsustainable mortalities (WAKEFIELD et al. 2002). Today the Przewalski's horse is fully protected in Mongolia.

Given the small number and narrow gene pool of free-ranging Przewalski's horses, one conservation concern is hybridization with domestic horses (WAKEFIELD et al. 2002). This has occurred prior to extinction in the wild, but also during the earlier phase of the captive breeding program (BOWLING et al. 2003). In addition, free-ranging wild horses need daily access to water and good pastures to thrive and re-introduced groups only slowly expand their home range (GANBATAAR 2003). Thus the water points and pastures close to the adaptation enclosure are especially important for newly released wild horses.

The Great Gobi B SPA is also home to an estimated 2,000 Asiatic wild asses (khulan in Mongolian; READING et al. 2001, FEH et al. 2001, MONGOLIAN MINISTRY OF ENVIRONMENT 2003, KACZENSKY & GANBAATAR unpubl. data). In the IUCN Equid Action Plan the status of *Equus hemionus* is qualified as "insufficiently known" and the species is listed as vulnerable (FEH et al. 2002). Most probably no more than 5,000 individuals remain outside of Mongolia and China and therefore Mongolia is a globally important stronghold of the Asiatic wild ass (FEH et al. 2002).

In Mongolia the khulan has received full protection since 1953. It is also listed in appendix I of the Convention on International Trade of Endangered Species (CITES) and in 2002 was included in appendix II of the Convention of Migratory Species (Bonn Convention, CMS 2002). However, due to human population growth in conjunction with severe winters in the past years (UNITED NATIONS DISASTER MANAGEMENT TEAM 2000), the occurrences of herder - khulan conflicts appears on the increase. Competition for pastures and water and poaching for meat seem to be increasingly becoming a problem in Mongolia (see this volume). For some locals, wild ass meat seems to provide a substitute or even a cheap alternative to meat from domestic animals (KACZENSKY & GAMBATAR unpubl. data). In 2005, a national survey based on questionnaires, suggests that up to 2,000 wild asses may be poached each year throughout their distribution range in Mongolia (WINGARD unpubl. data). Moreover, political changes in the early 1990's forced urban population to return to nomadic land use, resulting in a sharp increase in human- and livestock numbers in many rural areas (FERNANDEZ-GIMENEZ 1999, BEDUNAH & SCHMIDT 2004, MEARNS 2004).

Because Mongolia's rural economy is largely based on livestock, wild equids have to coexist with semi-nomadic pastoralists (FERNANDEZ-GIMENEZ 1999, MEARNS 2004). In the Gobi almost 99% of the desert and desert steppe are used as livestock pastures. In such habitats long-distance transhumance is a necessity for sustainable pastoralism and semi-nomadic herders need access to large tracts of land, including protected areas (BEDUNAH & SCHMIDT 2004, FERNANDEZ-GIMENEZ & BATBUYAN 2004). Given the highly ambitious goal of the Mongolian government to set aside 30% of Mongolia as protected areas by 2030, it becomes even clearer that pastoralists can not be excluded from protected areas. Thus the consideration of local livelihoods and local people and their demands into protected area management has become a necessity (BEDUNAH & SCHMIDT 2004).

In the past little consideration was given to the rights and needs of local people when establishing protected areas. Recently there is a shift towards people-friendly protected areas and an utilitarian concept of biodiversity conservation (WORLD PARKS CONGRESS 2003, PRETTY & SMITH 2004, TERBORGH 2004). However, nature conservation and local livelihood improvements may not always be compatible and we cannot expect that poverty alleviation and community development will automatically result in improvements for nature conservation (HUTTON

& LEADER-WILLIAMS 2003, SANDERSON & REDFORD 2003, BERKES 2004, CHRISTENSEN 2004). In many protected areas overgrazing, and competition with wild ungulates are important management concerns both for local people and wildlife managers (BEDUNAH AND SCHMIDT 2004).

An important prerequisite towards co-management is to identify and understand the nature of existing conflicts. In the following paper we present a case study from the Great Gobi B SPA in south-western Mongolia focusing on herder-wild equid conflicts. We show that simple approaches such as interviews of local herders, livestock inventories, and the mapping of livestock and wildlife can provide valuable baseline data from which further management and research needs can be derived.

2. Study area

The Great Gobi B SPA was established in 1975 and encompasses 9,000 km² of desert steppe and desert habitat (ZHIRNOV & ILYINSKY 1986, ENEBISH & MYAGMASUREN 2000, KACZENSKY et al. 2004). The Great Gobi B SPA has been a traditional livestock grazing area and in the 1970s close to 60,000 livestock used the area (ZHIRNOV & ILYINSKY 1986). When the strictly protected area was established in it was a top-down approach by the central government and local people had little say or direct involvement in the creation, design, or management of the protected area. However, the importance of the area for livestock grazing was acknowledged and future use guaranteed based on detailed regulations on livestock camp locations and herder movements (ZHIRNOV & ILYINSKY 1986). Two zones were established in the SPA, a core zone (~ 1,800 km²) in which no livestock camps are allowed and a surrounding zone (~ 7,200 km²) where livestock camps are allowed at pre-established locations (fig. 1). However, neither maps nor location names were available at the park administration or elsewhere. To buffer the effects of human land use in the surrounding of the park, a buffer zone (5,700 km²) was added to the park in the 1990s (fig. 1).

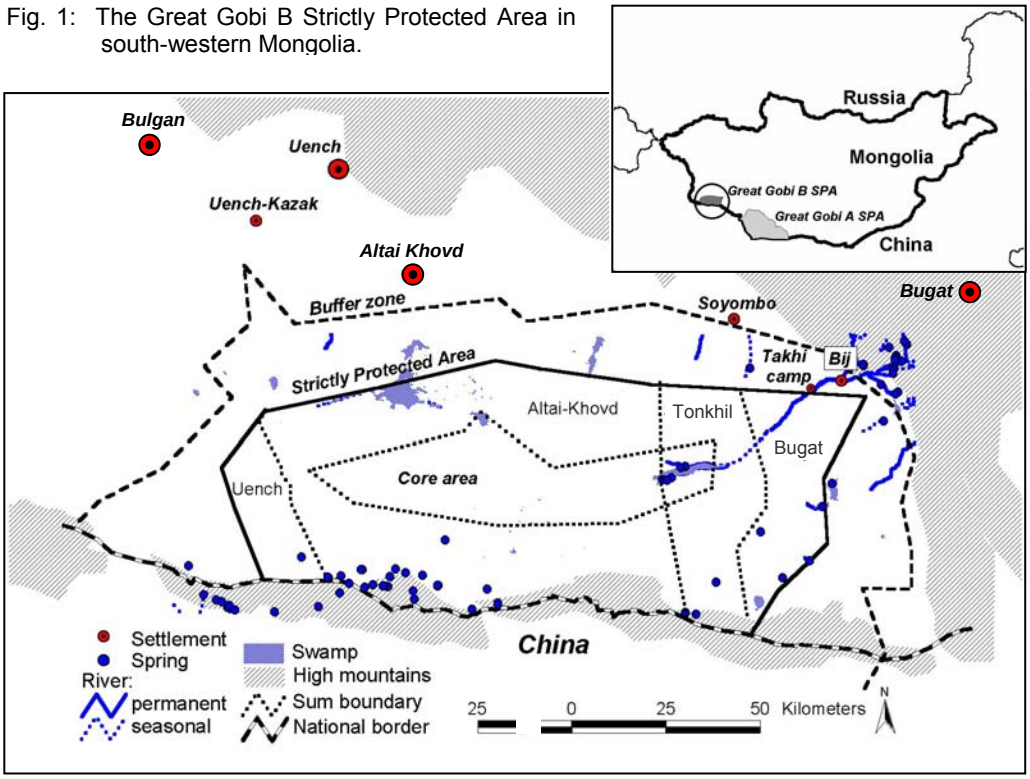
The Great Gobi B SPA falls within the jurisdiction of two provinces (Khovd and Gobi-Altai aimags) and four regional administrations (Bugat, Tonkhil, Uench and Bulgan soums). There are six settlements with close to 9,000 people in the vicinity of the park (fig. 1; table 1). The Gobi aimags are the centre of the Cashmere goat industry in Mongolia, and the main income in the Great Gobi B region is from livestock products (NATIONAL STATISTICAL OFFICE OF MONOLIA 2001, BEDUNAH & SCHMIDT 2004, MEARNS 2004).

The climate of the Great Gobi B SPA is continental with long cold winters and short, hot summers. The temperature extremes range from –40°C in winter to +40°C in summer; the annual average is –0.5°C. Average snow cover lasts 97 days, but can be highly variable from year to year (ZHIRNOV & ILYINSKY 1986, GANBATAAR unpublished data). The winter 2000/2001 was particularly severe in the Great Gobi B region, when the combination of a dry summer followed by a very cold winter with a lot of snow (dzud in Mongolian) caused massive livestock losses (UNITED NATIONS DISASTER MANAGEMENT TEAM 2000). Average yearly rainfall is about 100 mm throughout the park, with most precipitation during the summer months.

The landscape of the Great Gobi B SPA is dominated by low relic mountains in the east and rolling hills country in the west. To the north the southern tip of the Altai range flank the park and to the south the Takhin Shar Naruu border mountains. Elevations range from 1,000 m near the northwestern corner of the park to 2,840 m along the Mongolian-Chinese border in the south.

Open water (rivers, springs and swamps, referred to as water points) is unevenly distributed with most springs in and along the high mountain range in the southwest (fig. 1). There are considerably more water points in the eastern third of the park, than in the central or western part. Within the designated core area there are only two water points, both swamp areas with several springs (fig. 1).

Fig. 1: The Great Gobi B Strictly Protected Area in south-western Mongolia.



The desert areas are widely dominated by Chenopodiaceae, such as Saxaul (*Haloxylon ammodendron*) and *Anabasis brevifolia*. The steppe areas are dominated by Asteraceae such as *Artemisia* ssp. and Poaceae like *Stipa* and *Ptilagrostris*. Trees (*Salix* ssp. and *Populus diversifolia*) are restricted to very few water points, mostly in the buffer zone of the strictly protected area (HILBIG 1995, VON WEHRDEN & TUNGALAG 2004).

Despite human use, plant- and small mammal diversity remains high (HILBIG 2000, LKHAGVASUREN 2004, VON WEHRDEN & TUGALAG 2004) and the area is also home to several globally threatened or vulnerable large mammal species (ZHIRNOV & ILYINSKY 1986, KACZENSKY et al. 2004). The ungulate community of the steppe areas consists of black-tailed gazelles (*Gazella subgutturosa*), Asiatic wild ass and Przewalski's horses. In the mountains ibex (*Capra sibirica*) are common, but argali (*Ovis ammon*) have become rare and seem mainly restricted to the southwestern corner of the park. Common mammalian predators are the grey wolf and red fox (*Vulpes vulpes*). The status of the Corsac fox (*Alopex corsac*), the Pellas' cat (*Felis manul*), the wild cat (*Felis sylvestris*), the lynx (*Lynx lynx*) and the snow leopard (*Uncia uncia*) are largely unknown, but at least the latter two seem very rare.

3. Methods

3.1. *Human population & livestock trends*

We obtained data on human population (available since 1985) and livestock (available since 1970) from the National Statistical Office in Ulaanbaatar on the soum level at 5-year intervals.

We visited the chairmen (mayor) of the regional administrations to obtain data on livestock numbers, composition and nomad camp positions (location names). Together with the park rangers we marked locations of herder camps on 1:200.000 Russian topographic maps. For

more specific questions we additionally interviewed 54 herder families from the eastern part of the park (Bugat soum) in 2000, 2001 and 2002.

Table 1: Human population numbers in the regional administrations encompassing the Great Gobi B Strictly Protected Area in SW Mongolia in 2003

Province (aimag)	Settlements within 50 km^2 of SPA	Population	District (soum)	Area in the park	% of park area
Gobi-Altai	Bugat	714	Bugat	1,110	12
	Bij	550			
	Soyombo	522	Tonkhil	1,380	15
Khovd	Altai-Khovd	1,162	Altai-Khovd	5,910	66
	Uensch	1,940	Uensch	590	7
	Bulgan	3,983	Bulgan	0	0
	total	**8,871**		**8,990**	

For comparison between families, we converted livestock numbers into sheep food units (sfu), where 1 sfu is the amount of dry forage needed to feed an average Mongolian sheep for 1 year, which is approximately 365 kg (FERNANDEZ-GIMENEZ 1999). The equivalencies for the other species are: 1 camel = 5 sfu, 1 horse = 7 sfu, 1 cow/yak = 6 sfu, 1 goat = 0.9 sfu. Were data on species composition was missing, we assumed the same ratio as for families with known livestock species composition.

We used the definition by LUVSANDORJ (2002) to classify families as (1) poor when they owned ≤ 200 sfu, (2) self sufficient (have enough to produce merchantable products) when they owned 201-1,000 sfu and (3) wealthy when they owned > 1,000sfu.

3.2. *Distribution of wild and domestic ungulates*

We monitored wild and domestic ungulate presence in the eastern part of the park (Gobi-Altai aimag) from May 2003 until December 2004 using a distance sampling approach (BUCKLAND et al. 2001). For each survey, attempted on a monthly basis, we drove 350-370 km on 17-23 transect lines. We always travelled with a minimum of 4 people at a maximum speed of 40 km/hour. When an animal was spotted, we stopped the jeep, marked the location on a GPS (GARMIN II Plus with external antenna on the jeep roof, GARMIN Corporation, Romsey, UK), and took a bearing with a handheld compass, estimated the distance to the animal and noted species, group size and behaviour. Each survey track was documented using the tracking function of the GPS (registration interval 1-2 minutes). To minimize the impact on the fragile desert flora we used existing dirt roads; instead of a random transect approach. This clearly violates the requirements of distance sampling, but suffice to get a relative measure for the presence and distribution of domestic and wild ungulates. We do not believe that animals avoid dirt tracks as vehicle traffic is generally low on these tracks and poachers do not restrict themselves to tracks. We additionally conducted 4 whole park surveys of 766-803 km in spring (18-22 April), summer (8-12 August), fall (15-20 October), and winter (10-14 December) 2004.

Rangers checked individual Przewalski's horse groups 1-4 times each week and recorded the coordinates based on a simple raster map. The raster size is 2 x 2 km. The horizontal position of each raster cell is coded by a number, the vertical position by a letter (see KACZENSKY & WALZER 2002b). With a simple macro, raster codes are converted into the central GPS position of each raster cell.

We used ArcView 3.1 (ESRI, Environmental Systems Research Institute, Inc., Redlands, California, USA) and the Animal Movement extension (HOOGE & EICHENLAUB 1997) to visualize data. For all statistical analysis we used SPSS 10.0 (Statistical Package for the Social Sciences; SPSS Inc., Chicago, Illinois, USA).

4. Results

4.1. *Livestock numbers & composition*

Based on the information provided by the chairmen 111 families with 57,656 head of livestock or 79,900 sheep food units (sfu) used the park each year in 2000 and 2001 (average stocking density: 11.2ha/sfu; table 2). Unfortunately, data on livestock numbers in the Great Gobi B SPA have not been systematically collected. For comparison only the data provided by ZHIRNOV & ILYINSKY (1986) in 1975 (~ 60,000 animals) is available and suggests that livestock grazing in the SPA has remained at more or less the same level over the last 30 years.

For 51 out of the 54 families (94 %) interviewed, livestock herding was the main source of income and the majority of families (89 %) were herding predominantly their own livestock (≥ 70% of herded stock is owned). The average family owned 519 (SD ± 384) head of livestock or 779 sfu (SD ± 530). Ten percent of the families were poor (≤ 200 sfu), 62 % self-sufficient (201-1,000 sfu) and 28 % wealthy (> 1,000sfu). For 96 families where detailed data on livestock composition was available, the composition was: 92 % sheep and goats, 5.5 % horses, 2 % cattle and yaks and 1.5 % camels (table 2).

Table 2: Livestock numbers and composition for herders using the Great Gobi B SPA Bugat soum [Bij 2000/1 (18,218), Soyombo 2001/2 (7,217)], Altai-Khovd soum 2000/1 (16,221), and Uench soum 2000/1 (16,000; no data on species composition available) administrations

	N[1]	Min	Max	Sum	Mean	SD
Sheep	51	5	1,610	10,064	197.33	253.36
Goats	51	10	510	6,732	134.64	103.10
Sheep + goats	96	0	2,120	38,383	399.82	323.24
Horses	96	0	240	1,862	19.40	30.93
Camels	96	0	50	617	6.43	7.26
Cattle	96	0	75	794	8.27	12.32
all livestock	111	24	2,136	57,656	519.42	383.85

[1] number of families for whom data was available at this level

Whereas the number of livestock in the park remained basically the same, the number increased by 26 % in the surrounding areas (fig. 2). Human population also increased at a similar rate and the ratio of livestock to inhabitants has remained more or less stable at 37:1 (fig. 2). The most dramatic change was in the composition of livestock. Whereas sheep were the dominant stock before 1990, nowadays goats are the dominant stock and make up for 52 % of all stock (fig. 3).

4.2. *Herding regime*

Of the 54 herders interviewed in 2000, 53 (98 %) stated that their livestock is guarded. However, only sheep and goats are permanently guarded. During daytime most sheep and goat herds are accompanied by a herder and in the evening they are herded back to the ger (traditional Mongolian felt tent). There they either spend the night resting unrestrained around the ger or in a nearby corral. The grazing of sheep and goats is predominantly within a radius of 2-5 km around the ger (also see MEARNS et al. 1994).

Horses, camels and cattle are rarely guarded and only sporadically checked. Young are generally born away from humans and in most cases no special precautions are taken to protect them from predation or adverse weather conditions. The activity range of large stock is not restricted to the vicinity of the gers and cattle, horses and camels can be found up to 40 km from herder camps (GANBAATAR unpubl. data).

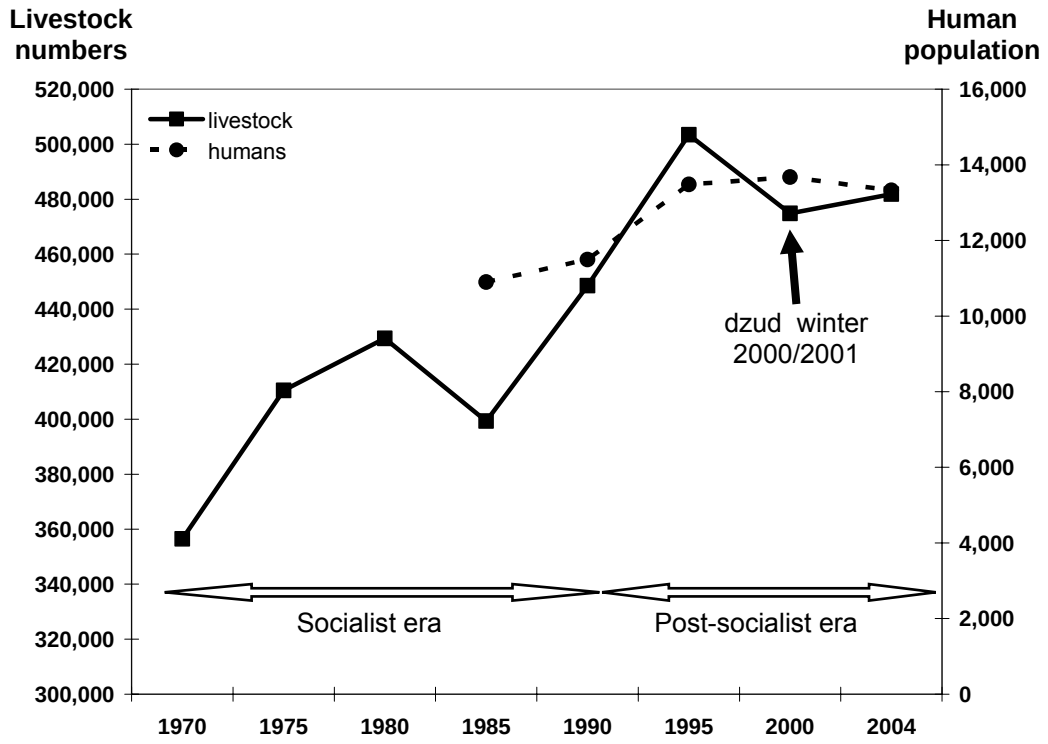


Fig. 2: Human population and livestock numbers for Bugat, Tonkhil, Gobi-Altai and Uench districts 1970-2004 [source: Statistical Office of Mongolia unpubl. Data].

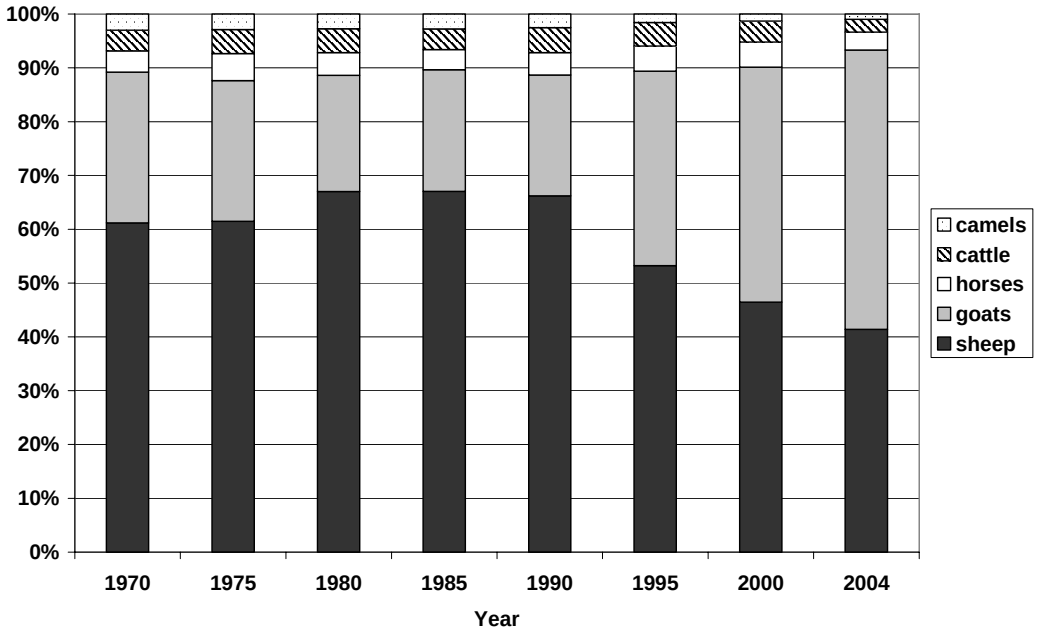


Figure 3: Livestock composition for Bugat, Tonkhil, Gobi-Altai and Uench districts 1970-2004 [source: Statistical Office of Mongolia unpubl. Data].

Table 3: Wild- and domestic ungulates counted during wildlife transect counts (16-23 transects lines for a total of 350 km) in the eastern part (Gobi-Altai aimag) of the Great Gobi B SPA in SW Mongolia. The data presents raw counts and cannot be used as a substitute for population size because the distance sampling approach allows for double counts in independent transects

period	Wild asses		Gazelles		Sheep/goats		Horses		Camels		Yaks/cows	
	sum	N	sum	N	sum	N	sum	N	sum	N	sum	N
Spring 2003												
30.04.-01.05.2003	220	23	508	80	4,550	7	406	31	233	24	77	6
31.05.-01.06.2003	130	30	172	60	2,878	11	321	18	206	26	85	8
Summer 2003												
01.- 02.07.2003	2,693	87	287	75	37	1	20	1	177	7	0	0
05.- 06.08.2003	995	40	270	48	0	0	1	1	245	12	0	0
Fall 2003												
06.- 08.09.2003	65	10	195	29	2,100	6	334	10	101	7	78	5
06.- 07.10.2003	289	9	41	9	2,900	6	184	13	171	13	108	5
Spring 2004												
24.- 25.03.2004	1	1	145	11	1,310	4	354	14	177	14	0	0
15.- 16.04.2004	110	5	321	56	5,703	16	522	23	212	15	121	10
16.- 17.05.2004	520	48	305	90	2,978	8	88	10	173	17	79	4
Summer 2004												
07.- 08.06.2004	823	47	168	58	0	0	150	9	106	8	89	2
05.- 06.07.2004	898	31	293	65	0	0	0	0	50	4	0	0
08.- 10.08.2004	488	28	234	48	0	0	0	0	74	6	0	0
Fall 2004												
05.- 07.09.2004	2,230	53	265	43	2,760	7	141	9	189	9	74	5
15.- 20.10.2004	1,234	9	100	21	7,600	13	419	18	144	11	99	4
12;14;16.11.2004	132	8	5	2	6,500	9	199	9	73	9	97	7
Winter 2004												
10.- 14.12.2004	330	5	6	1	4,000	6	175	10	21	3	44	3

4.3. *Herder movement patterns*

Most families predominantly use the park during the winter months (fig. 4). However, in the eastern part of the park some families additionally use the park for spring and fall camps. In the western part, families leave their winter camps in the foothills of the border mountains to China in spring and move towards their summer camps within 3-5 days. All summer camps are located in the Altai mountain range north of the park. Only a large portion of the camel stock remains year round in the park (also see table 3 and fig. 5).

Assuming a maximum grazing impact of 5 km around each herder camp, 33 % of the park area is exposed to regular grazing by small stock (68 % of the area in the Gobi-Altai province and 19 % of the area the Khovd province). The core area is almost unaffected by small livestock grazing, but horses, camels and cattle are regularly observed in Chonin Us, the central water point of the park, during winter (GANBAATAR 2003, O. GANBAATAR unpublished observation).

Most water points in the Great Gobi B SPA are located along the boundary of the park and almost all are used by semi-nomadic herders during spring and fall. Only the two large swamp areas in the core area, Chonin us and Takhi us, do not receive human use apart from occasional emergency shelters during the migration (see fig. 1, fig. 4 and fig. 5).

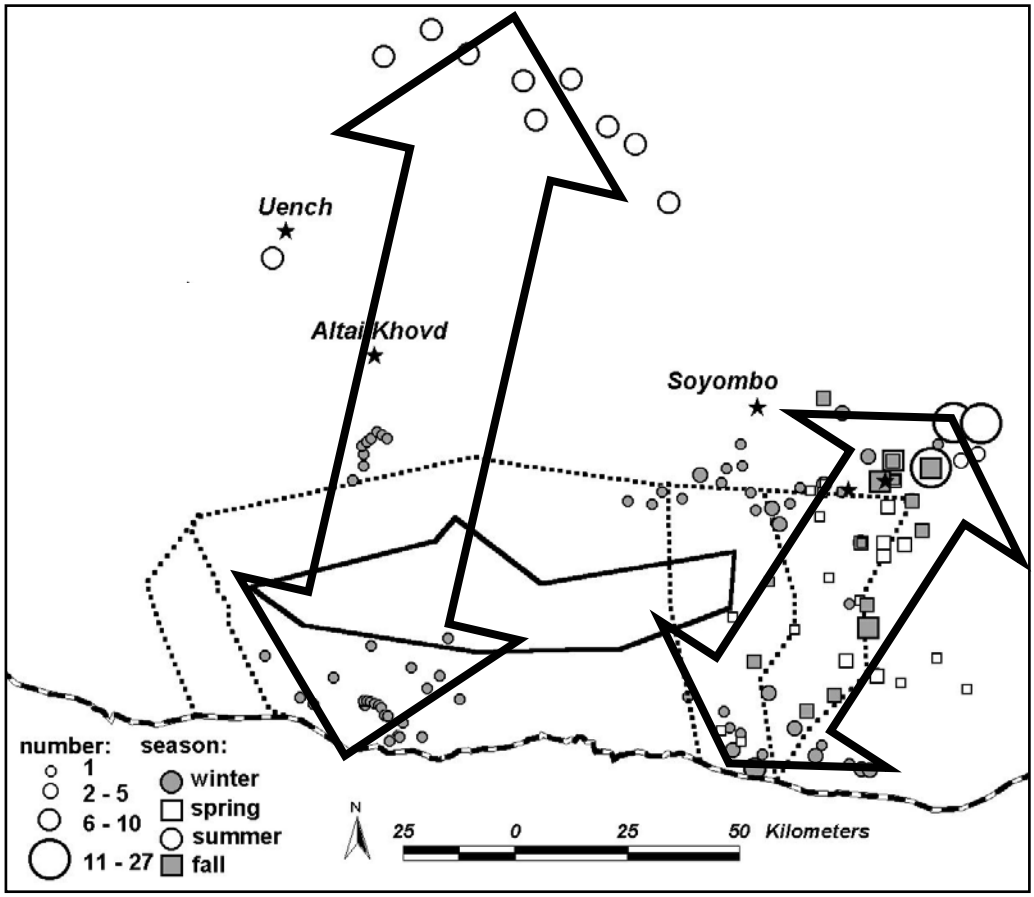


Figure 4: Seasonal camp location and main movement corridors of 111 families using the Great Gobi B SPA for grazing in 2001-2003.

4.4. *Herder-wild equid relationship*

Fifty-two out of the 54 herders (96 %) interviewed believed the wild ass population had increased with 2 unsure about the trend. No quantitative data on the attitude towards wild ass were available, but wild asses were predominantly considered competitors for winter pastures. Attitudes towards the small re-introduced Przewalski's horse population, on the other hand, seemed largely positive. Many people explicitly stated they were proud that an extinct species came back into its homeland and that humans have an obligation to protect wildlife.

However in 2002, we documented the poaching of four gazelles, two wild asses and one wild horse as an indirect effect of other research activities. In 2003, poachers killed one radiocollared wild ass and we discovered the remains of three other poached wild asses. Indications for poaching were car or motorbike tracks around the carcass, knife cut marks and bullet holes. Often the body was removed and only the lower legs hide and head remained.

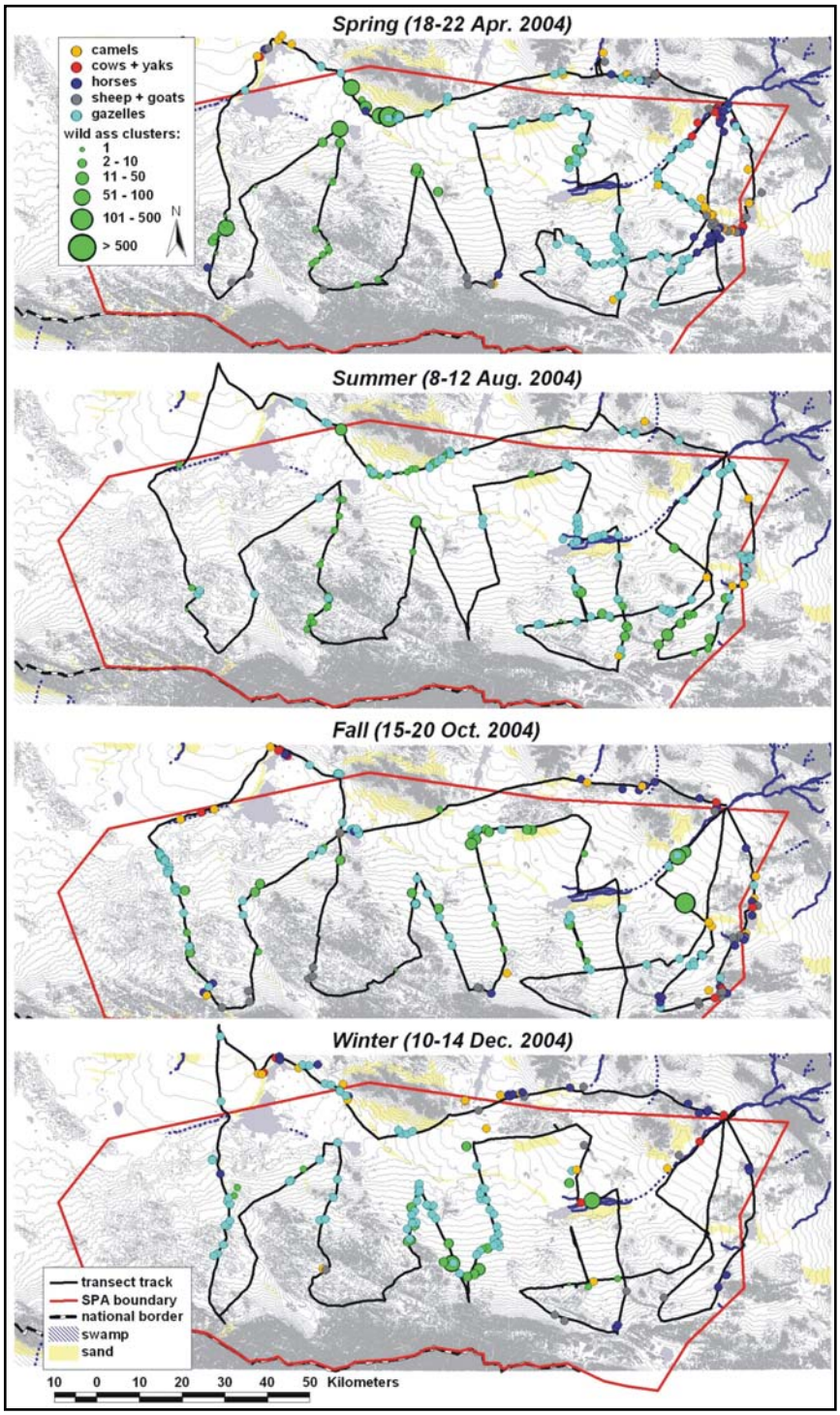


Figure 5: Distribution of wild- and domestic ungulates seen during four whole park surveys in the Great Gobi B SPA. Each survey covered a track of 766-803 km.

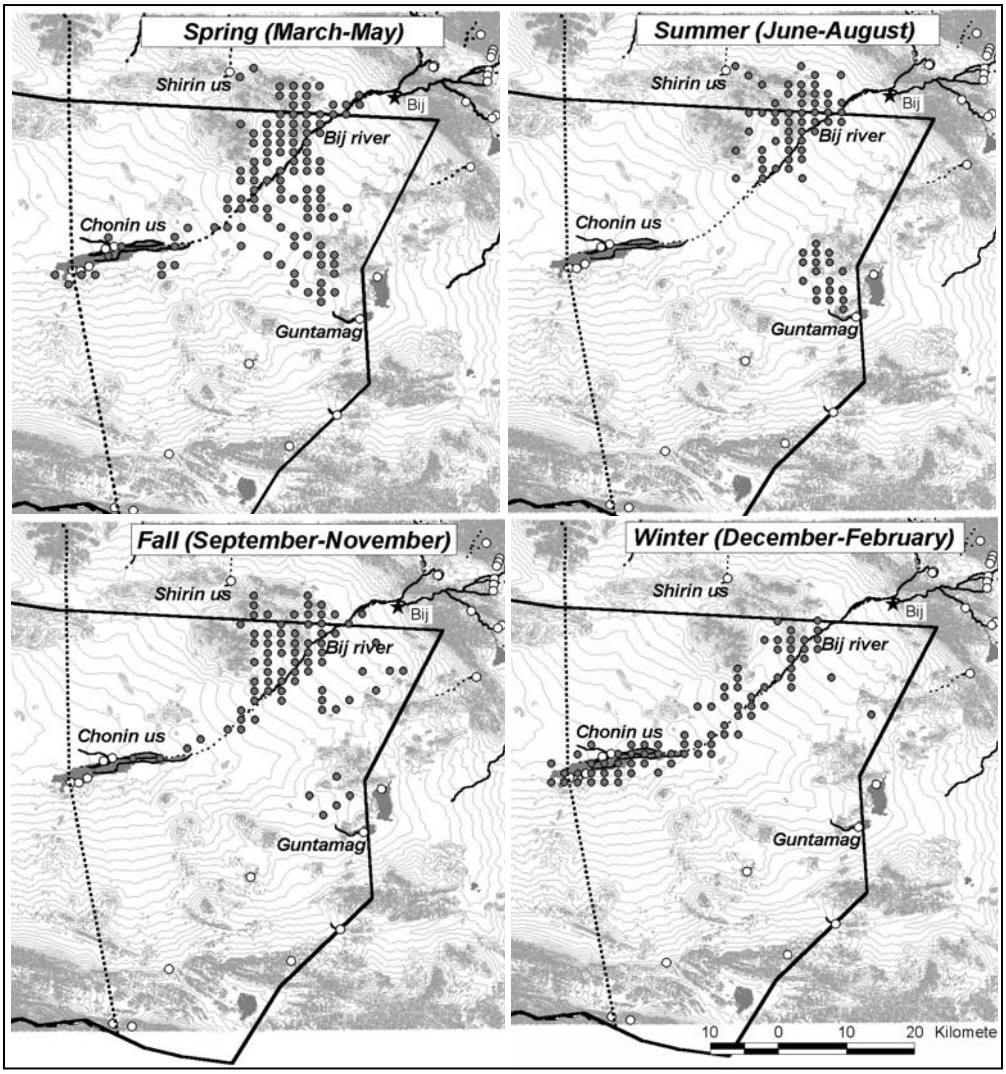


Figure 6: Raster based (2 x 2 km) seasonal distribution of 5 free-ranging Przewalski's horse groups located by rangers 1-4 times a week from 16 October 2002 until 19 June 2004 (total number of locations: 886).

The conflict level between herders and Przewalski's horses seems minimal and most herders claimed they like the wild horses and are happy of the re-introduction project (Ganbaatar 2003, IPE-CON / NZNI 2003). Presently wild horse presence is restricted to a 1,211 km² area in the north-eastern part of the park and wild horses only make use of 4 water points (Bij river, Shirin us, Chonin us and Guntamag; fig. 6). Three of these water points are also used by herders and their stock in spring and fall (fig. 5).

Herder presence along the Bij river does not seem to impede wild horse access to water (fig. 6). However, herder presence at punctual water points with limited access appears to discourage use by established wild horse groups. The *Pas* harem group makes intensive use of the water point Guntamag at the south-western edge of the park during the summer, but not before most of the herder families have moved away in mid May and not after families move back in mid September (fig. 6).

Wild horse-domestic horse interactions during the critical reproductive period (June-August) were minimal, as most livestock, except for most camels, leaves the park by early to mid June (table 3, fig. 5). Only few horses owned by rangers and people living in the village of Bij remain.

Fig. 10:

5. Discussion

5.1. *Data collection and visualization*

So far local people, including rangers, were restricted in the spatial scale of their knowledge to the vicinity of their camp or their district. Foreign visitor presence, on the other hand, had been largely restricted to the summer months and the area of the Przewalski's horse re-introduction site in the northeast. Their prevailing impression was that the Great Gobi B SPA is an area almost untouched by human presence and use.

Rangers have been observing the re-introduced Przewalski's horses since their first releases into the wild in 1999 and also knew that Asiatic wild asses and gazelles show seasonal movements. However this knowledge was not readily accessible and difficult to evaluate or share with others. The simple and standardized monitoring methods we introduced in 2002, raster map monitoring of Przewalski's horses and GPS supported wildlife surveys, provide data that can be easily visualized. In combination with herder camp mapping, this provided for the first time a conclusive and easily understandable picture of the whole Great Gobi B SPA for locals, managers and scientists alike. Although conclusions drawn by the different stakeholders might differ, there is at least a common data base to start with - an important prerequisite when moving towards co-management schemes.

5.2. *Grazing pressure*

Although human and livestock numbers of the four districts around the SPA did follow the national trend of a shape increase with the breakdown of the socialist system in the early 1990s, the number of livestock grazing in the Great Gobi B SPA has actually remained at approximately the same

level as in the 1970s. Although vegetation is not systematically monitored in the Great Gobi B SPA, the impact of goat versus sheep grazing on the vegetation in the Gobi ecosystem remains unknown. Compared to other areas of Mongolia, pasture condition in the Great Gobi B SPA suggest only a low to moderate grazing pressure (K. WESCHE pers. obs., VON WEHRDEN pers. obs.). As compared to other gobi areas (e.g. Bayan-Ovoo or Jinst soum 2.8-3.2 ha/sfu; FERNANDEZ-GIMÉNEZ 1999) stocking rates are relatively low when averaged over the whole park area (11.2 ha/sfu). Although stocking rates are locally much higher - a large portion of the park is not available to grazing due to the lack of open water – it is also highly seasonal and largely restricted to the winter period. Thus pasture conditions in the Great Gobi B SPA have remained largely intact and economically (expressed in sfu), herders using the Great Gobi B SPA seem somewhat better off (average 779 sfu) than herders in other gobi regions (e.g. in Gobi Gurvan Saikhaan National Park the average is 630 sfu; BEDUNAH & SCHMIDT 2004).

In addition, the lack of attractive urban centres (in respect to job opportunities, health care and education) near the park seems to discourages immigration of new herders and the area lacks livestock concentrations, a major cause of land degradation observed elsewhere in Mongolia (FERNANDEZ-GIMÉNEZ 2002, BEDUNAH & SCHMIDT 2004, MEARNS 2004). Local herders also largely still execute traditional long-distance transhumance between summer and winter camps, a further important prerequisite for a sustainable grazing regime in non-equilibrium, semi-arid and arid environments (FRATKIN 1997, SNEATH 1998, FERNANDEZ-GIMÉNEZ 2002, BEDUNAH & SCHMIDT 2004, MEARNS 2004).

5.3. *Herder-wild equid relationship*

Several authors assume that the dramatic reduction in the wild ass distribution range worldwide is due to competition for water and pastures (for summary see FEH et al. 2002). Qualitative data from the ungulate surveys suggest that In the Great Gobi B SPA wild asses also largely avoid water points occupied by humans and their herds. However, we were unable to prove the causal relationship of wild ass movements and herder presence at water points. For the future we suggest monitoring of wild ungulate behaviour, frequency and timing at water points visited by humans and their livestock as compared to those without human use.

Recent satellite telemetry data of Asiatic wild ass in the Great Gobi B (over 3,000 locations of 7 individual animals; KACZENSKY & WALZER 2002-2004; KACZENSKY, GANBAATAR & WALZER unpubl. data) support the assumption that wild ass movements are almost exclusively restricted to the park. This highlights the importance of the Great Gobi B SPA for wild ass conservation. We still miss empirical data why wild asses are confirmed to the Great Gobi B SPA. Possibly the increase in human population and the resulting increase in livestock numbers have excluded khulan in the surrounding of the park, due to competition for water and pastures. In-depth analysis of radio tracking data can be expected to provide a better insight into habitat preferences and habitat use of wild ass, not only relative to water availability and human presence, but also relative to plant community distribution and biomass production.

Due to the unequal distribution of herders, herder-wild horse conflicts can be expected to be highest in the eastern part of the park. Compared to wild asses which make use of all available water points in the park, wild horses only use 4 different water points (GANBAATAR 2003) and have a much restricted distribution range. Some herders have already stated that they do not support a further increase in the wild horse population (IPECON / NZNI 2003).

The wild horse re-introduction project should aim to extend the wild horse range further west, thus largely avoiding the more intensively grazed areas and minimizing domestic-wild horse interactions. In addition, we recommend that the only two water points in the core area, Chonin Us in the east and Takhi Us at the northern edge, remain primarily reserved for wildlife. To avoid hybridization with Przewalski's horses it should become mandatory to move all domestic horse stock out of the SPA during the breeding season in summer. Only few owners are affected and for them pasture use outside of the park needs to be negotiated and organized in cooperation with the park administration.

5.4. *Sustainable use option*

Under favourable conditions equids can have a high reproductive rate (SALTZ 2002, SLOTTA-BACHMAYER et al. 2004) and growing ungulate populations will intensify competition for (winter) pastures. This is especially true for wild asses which frequently aggregate in large groups of up to 1,000 individuals (KACZENSKY & GANBAATAR unpubl. data). Presently there is no incentive for locals to support wild ass conservation and a possible solution to improve attitudes and combat poaching would be to allow a controlled harvest of wild asses by local herder families.

Wild ass can make use of marginal habitats, habitat closed to human use (core area of the SPA) and do not require labour intensive herding. By allowing a controlled harvest, wild asses would gain an economic value and attitudes could possibly be changed to appreciate them as a resource (also see BEDUNAH & SCHMIDT 2004). Given the large size and the low financial capacity of the park, co-management seems to be the only chance to effectively combat illegal harvest. Management goals need to be negotiated with the local people beforehand and a monitoring and controlling schemes implemented (DIFFENDORFER & DOHERTY 2004, SATERSON et al. 2004). Furthermore, more research on the habitat use, social organization, feeding ecology and movement patterns of wild ass and other wild ungulates would be desirable.

5.5. *The value of ground-based wildlife transects*

So far poachers have run a low risk of being detected, as there are few rangers with very limited mobility and no communication system. Discovering the remains of poached animals is difficult because vultures (black vultures - *Aegypius monachus* and griffon vultures - *Gypus fulvus* or *G. himalayensis*) quickly clean up any fresh carcasses, often within hours of the actual killing (KACZENSKY unpubl. data).

In fall 2003 we organized the first park-wide wildlife count. Although the data is only of limited use for meaningful population size and trend estimates (KACZENSKY unpubl. data), these surveys are nevertheless of importance to park management: (1) they provide data on the distribution of wild- and domestic ungulates, (3) they establish regular communication between herders and rangers throughout the entire park, and (4) ranger presence and law enforcement is apparent throughout the park.

6. Conclusion

Given the remoteness of the Great Gobi B SPA and its distance to large urban centres, the magnitude of the herder-wild equid conflict is rather low. Overgrazing is not an issue and the park still supports a large number of wild ungulates. To raise awareness for the uniqueness of the area the Przewalski's horse, a well-liked species of high cultural significance for Mongolians, should be used as a flagship species to promote the idea of nature conservation and gain support, financially and ideally, for the protection of the Great Gobi B ecosystem. There are still many knowledge gaps and local people need to be more actively involvement in park management. As this is a rather new approach in Mongolia, we suggest park management to move towards adaptive co-management, accompanied by simple, but sound monitoring and evaluation schemes. Well documented, other regions of Mongolia or central Asia could also profit from the experience gained. However, building up the social capital and institutionalizing a co-management approach needs a long-term commitment in the magnitude of one to several decades (BERKES 2004, PRETTY & SMITH 2004).

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