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Current Status and Conservation of Mountain Ungulates in Mongolia

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Current status and conservation of mountain ungulates in Mongolia

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Abstract

In November 2009, we conducted a countrywide survey for wild sheep or argali and Siberian ibex. Field survey teams sampled in total 134 argali distribution units within Mongolia, which are estimated to occupy approximately 46,603 km² of the whole area of 60,237 km² that been previously mapped as populated by argali. They observed 385 groups of argali, totaling 3.373 individuals. Our point estimate of argali is 18,140 with a lower 95 % confidence limit of 9,193 and an upper 95 % confidence limit of 43,135.

Same time the authors observed 162 groups of ibex, totaling 2,541 individuals and our point estimate of ibex is 36,018 with a lower 95 % confidence limit of 13,840 and an upper 95 % confidence limit of 43,873. However, post-survey concerns about sampling in some aimags (provinces) and estimates derived previously allowed adjustments that resulted in the best single estimate for Mongolia being 17,903 ibex. Direct comparisons are difficult because the previous survey report lacked details of the areas visited, field methods, and analysis. Apparent increases or decreases in each aimag may be real, or may caused by differences in methods (HARRIS et al. 2010).

The data indicate that legal trophy hunting and poaching do not appear to be limiting argali and ibex populations on a national scale. Mongolia's climate and highly variable weather patterns appear to be the immediate limiting factors regulating argali and ibex populations. It is important that argali and ibex population trends be monitored every 3 to 5 years using the protocols reported here. The trend information reported here is the only information of its type, but should be considered as an initial effort. The more trend surveys that are conducted the less uncertainty there will be concerning the status of argali and Siberian ibex.

Keywords: argali sheep, Ibex, survey, distribution, Mongolia

Introduction

Argali (*Ovis ammon*) wild sheep occur throughout central Asia, including Mongolia's steppe, undulating desert, and rugged mountainous landscapes (GIEST 1991). Argali sheep and ibex, both high-mountain ungulates distributed widely but patchily across a large portion of Mongolia. Argali sheep (*Ovis ammon* Linnaeus, 1758) are present throughout the Mongolian and Gobi Altai mountains. In the Transaltai Gobi and Khovsgol, a few have been seen (BANNIKOV 1954, BAZARDORJ & SUKHBAT 1984, SUKHBAT 1978). Argali are also widespread in the provinces of Khovd, Gobi-Altai, and South Gobi, showing "normal" densities in Uvs, Bayan-Ölgii, Bayankhongor, Uburkhangai, and Dornogobi provinces, but are rare in some sums of Zavkhan, Dundgobi provinces. The current Mongolian law on hunting, established in1995 and administered by the Mongolian Ministry for Nature and the Environment, regulates the commercial use of wildlife. Hunting fees are an important source of foreign currently in badly depressed economy (MNEM 1995, 2012, WINGARD & PUREVDOLGOR 2001)

The ibex (*Capra sibirica* Pallas, 1776) is distributed through the mountainous areas of the Mongolian and Gobi Altai, in the west and central part of the Khentei mountain range, and in the mountains of Gobi, near Khovsgol lake and in the mountains of the Darkhad depression. It is widespread in Uvs, Khovsgol, Gobi-Altai and Southgobi provinces, but has a normal population density in Bayan-Ölgii, Bayankhongor, Uvurkhangai, Zavkhan and Khovsgol, and it is rare in Arkhangai and Dundgobi provinces.

Argali and ibex occurred in not continuous populations across whole Mongolia excluding eastern provinces. They prefer areas with rolling hills, mountains, rocky outcrops, canyons, and plateaus (AMGALANBAATAR & READING 2000, 2003; READING et al. 2001). Argali appear to be expanding their distribution in eastern Mongolia, but contracting and becoming even more fragmented in western Mongolia (MALLON et al 1997, AMGALANBAATAR et al. 2001, 2002; CLARK et al. 2006).

SHACKLETON & LOVARI (1997) and FENG et al. (2009) are among those who recognize two subspecies of argali occurring in Mongolia: the Altai argali (*O. a. ammon*) in western Mongolia, and the Gobi argali (*O. a. darwini*) in the Gobi Desert in southern Mongolia.

Mongolia permitted the taking of 1,630 males from 1967 to 1989 by trophy hunters (AMGALANBAATAR 1993). The Mongolian government recognized the threats to argali and began to manage hunting as early as 1953 (ZHIRNOV & ILYINSKY 1986, RED BOOK 1987, LUSCHEKINA 1994, READING et al. 2000, AMGALANBAATAR et al. 2003).

Although both species apparently remain relatively common, declines in recent years from overhunting led to both species being listed as rare in the Mongolian Red Book (1987, 1997 and 2013). The argali was categorized as vulnerable and ibex as least concern by the IUCN (2006), the argali is listed in Appendix II of CITES and CMS respectively (CLARK et al. 2006). Argali and ibex populations have declined in Mongolia and throughout Central Asia during the last century (HARPER 1945, HEPTNER et al. 1989, MALLON et al. 1997, READING et al. 1997). Specific and comparable countrywide population status and trend information for this species, a fundamental requirement for conservation (WEGGE & OLI 1997) is lacking.

Population estimate for Mongolia's argali as well as population trend since 1975

Mongolian Academy of Sciences estimated argali population in 1975 as 60,000 (AMGALANBAATAR et al. 2003). Other earlier estimates of argali numbers varied widely from less than 10,000 in 1976 (SHANYAVSKII 1976) to more than 40,000 in 1993 (AMGALANBAATAR 1993). The national population survey of argali in 2001 was using unpublished methods and had estimated that only 13,000 – 15,000 argali remain in Mongolia (TSERENBATAA et al. 2004). Few studies have examined Siberian ibex space-use and ranging basic biology information in Mongolia and most information is based on opportunistic observations and reports since 1974. Mongolian Academy of Sciences has conducted a few countrywide surveys; however, the methods used do not permit accurate population estimations.

Use of the same methods for both surveys (2001 and 2009) enables us to discuss population trend. We also discuss our findings to be relate to conservation and sustainable use of argali and ibex.

Study area

Our study area encompassed the entire Mongolian argali range in 2001 (fig. 1).

Study scope: After 2 training and organizational workshops (the first held in late March 2009, the second just prior to field work in late September 2009), eleven separate field teams spent 21 days each in 12 aimags (provinces) of Mongolia, where both species are distributed.

Field teams sampled 134 argali distribution units within Mongolia, which we estimate occupying approximately 46,603 km^2 of the total 60,237 km^2 of previously mapped as populated by argali. In addition to 20 line transects (of 10-20 km each), teams reported observing from 857 fixed points (table 1).

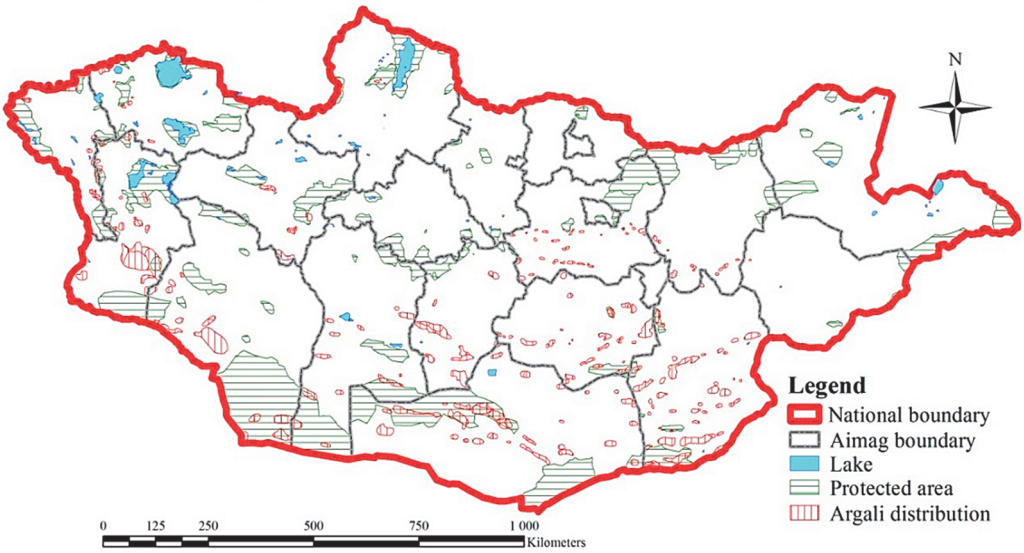

Fig. 1: Argali distribution map of 2002.

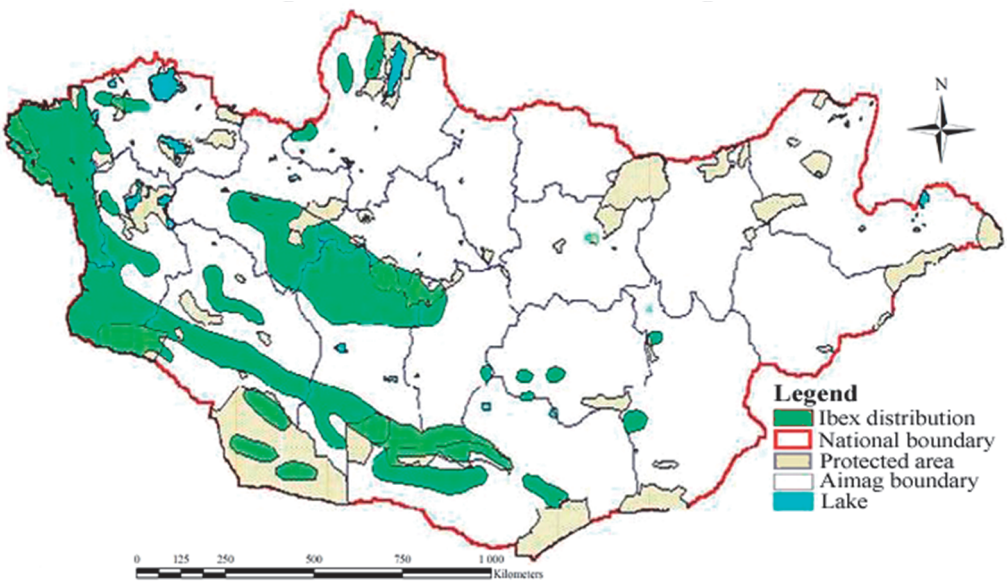

Fig. 2: Ibex distribution in Mongolia.

The teams' objectives were to update our understanding of the distribution of argali and ibex in their respective aimags, collect indirect information on the status of these animals by interviewing local officials and rangers, and conduct field surveys via walking, horseback, or vehicle in preselected sample areas. Totally, 48 people had working in the field survey.

Table 1: Argali distribution units (ADUs, previously mapped by Institute of Biology, Mongolian Academy of Sciences) sampled, number of line transects and fixed points from which observations of argali and ibex were made during the October 2009 survey of mountain ungulates in Mongolia. Also shown are the cumulative area of ADUS within each aimag and the area of those surveyed

aimag	ADUs sampled	line transects sampled	point transects sampled	mapped ADU per aimag (km^2)	ADU subject to survey (km^2)
Bayanhongor	12	0	50	3561	4,393
Bayan-Ölgii	9	0	59	4749	4,383
Dornogovi	13	14	67	9282	5,497
Dundgovi	18	6	90	4,439	4,258
Gobi-Altai	15	0	72	12,162	10,440
Hovd	11	0	51	8,370	6,296
Umnugobi	23	0	194	8,743	7,067
Uvurkhangai	1	0	41	3,894	1,522
Tuv	22	0	75	1,401	1,200
Uvs	5	0	23	2,247	1,547
Zavhan	5	0	135	1,389	unknown
Suhbaatar	0	0	0	1070.9	0
Huvsgul	0	0	0	613.8	0
Hentii	0	0	0	720.6	0
Arkhangai	0	0	0	1327.1	0
Bulgan	0	0	0	403.8	0
total	**158**	**20**	**880**	**50,215.4**	**46,603**

Methods

To reduce possible bias, areas previously mapped as containing argali (argali distribution units, ADUs) were prioritized for survey using a randomization scheme that favoured larger over smaller areas. Within each ADU, field teams most often pre-selected fixed vantage points from which to view the surrounding terrain, using maps produced from satellite-imagery (1:40,000 or 1:50,000 scale). In cases where obtaining an objective sample of terrain within the ADU was impossible, teams attempted to maximize the number of animals seen. All teams used GPS unit to document their own observation locations; most teams also mapped locations of animal groups observed and recorded subsidiary information related to detection probability; some teams additionally recorded radial (i.e., straight-line) distances between their observation points and animal groups. Subsequent to fieldwork, we used viewshed analysis in a GIS context to estimate the area effectively surveyed by each team. Where appropriate, we used distance sampling, treating observation points and point transects, to estimate the density of argali and ibex. We estimated abundance on 4-aimag basis, using the cumulative area of ADUs in each aimag as an expansion factor. Where distance methods were inappropriate but sampling was sufficiently objective, we used the estimates of effectively surveyed area as a sampling fraction for extrapolation of raw (i.e., minimum) counts. Where field sampling appeared to be inappropriate as a basis for extrapolation, we treated counts as indices, and report only raw numbers.

Results

Argali

The most recent nationwide and local data were produced by a survey conducted in autumn 2009. The field teams sampled from a total of 134 argali distribution units within Mongolia, which we estimate occupied approximately 46,603 km² of the total 60,237 km² of previously mapped as occupied by argali. The directly observed 385 groups of argali, totaling 3,373 individuals (table 2). The population estimate of argali is 18,140, with a lower 95 per cent confidence limit of 9,193 and an upper 95 per cent confidence limit of 43,135; table 2).

Table 2: Population estimate of argali sheep in different aimags

aimag	observed directly		abundance estimate		
	groups	animals	point estimate	lower 95 % CL	upper 95 % CL
Bayanhongor	15	143	572	444	927
Bayan-Ölgij	41	505	2123	931	3761
Dornogovi	156	841	2913	1361	4967
Dundgovi	46	294	2338	1505	15408
Gobi-Altai	16	81	1556	1066	9158
Hovd	9	341	2311	341	3400
Umnugobi	17	102	2404	1198	4852
Övörkhangai	39	310	1756	1160	2368
Tuv	19	142	834	417	1664
Uvs	19	591	1033	591	1591
Zavhan	8	23	40	23	50
Suhbaatar			50		
Hentii			180		
Huvsgul			30		
Total	**385**	**3373**	**18140**	**9193**	**43135**

In 10 years (2000-2009), in Khovsgol, Sukhbaatar aimags argali population remained stable, but range increased by 9.7-8.9 times, expanding in eastern Mongolia, which constitutes for the increase of distribution area in Gobisumber aimag by 3.2, Töv aimag by 2.3, in Bayankhongor, Dornogobi, Bayan-Ölgij, Uvs aimags by 1.2-1.9, whereas contracting and becoming more patchy in Khentii, Khovd, Omnogobi, Övörkhangai and Dundgobi aimags with distribution area decreased by 1.1-2.3 (fig. 3).

Our study showed the population of argali sheep in Mongolia appears to be declining rapidly due primarily to poaching and competition with domestic livestock, which have increased over the past decade (fig. 4). The decline of argali is likely the result of several factors; however, we believe that the two most important causes of decline are competition with livestock and poaching.

No rigorous nation-wide population estimates exist for Mongolia. The Mongolian Academy of Sciences has conducted a few countrywide surveys; however, the methods used do not permit accurate population estimation. Alternatively, they do provide some measure of population trends because similar methods were used. These surveys yielded round number estimates (lacking measures of precision) of 40,000 in 1970, 50,000 in 1975, 60,000 in 1985, and between 13,000-15,000 in 2001 (DULAMTSEREN et al. 1975, AMGALANBAATAR et al. 2002, GEBI 1986, IOB 2001, ZAHLER et al. 2004, CLARK et al. 2006, Mongolian Academy of Sciences, unpubl. data). READING et al. (1997) suggested that no more than 20,000 argali inhabited Mongolia in 1994.

The survey of the Academy of Sciences in 2001 suggested that approximately 10,000 - 12,000 argali inhabited the Gobi region of Mongolia (roughly corresponding to the range *of O. a. darwini*) and 3,000 – 5,000 argali inhabited the Altai region (roughly the range of *O. a. ammon* in Mongolia).

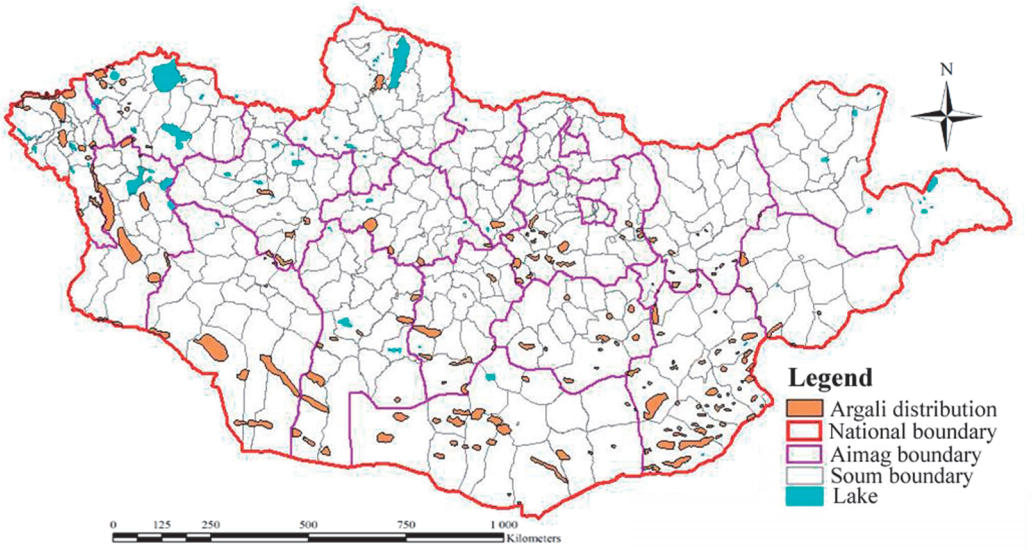

Fig. 3: Argali distribution map of 2009.

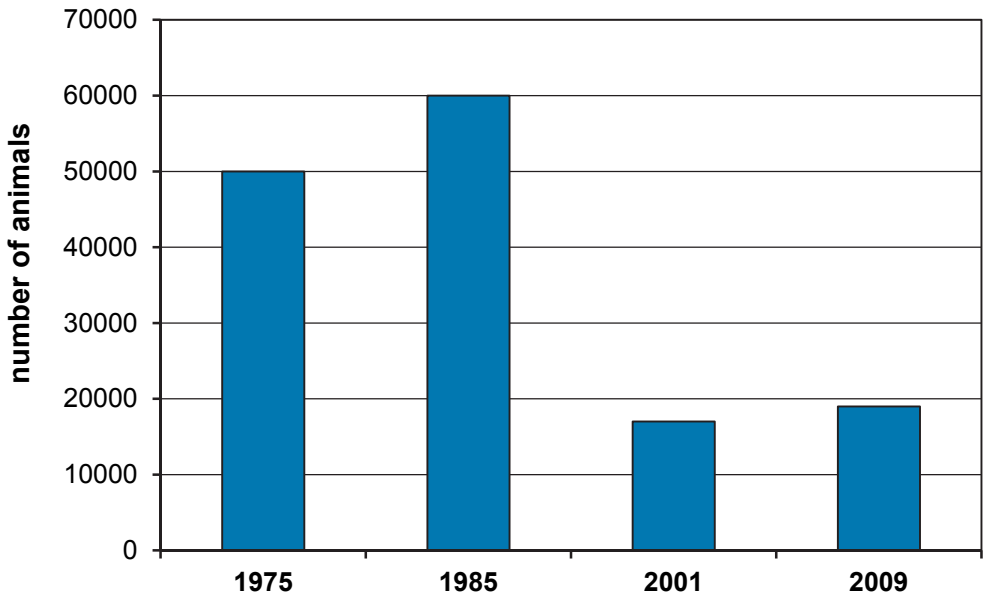

Fig. 4: Population size of Argali in Mongolia from 1975 up to 2009.

We compared argali population density and population size in 2001 and 2009 (table 3). It is difficult to gauge the accuracy of these figures given the methods and data provided in government reports, but on regional distribution data, it does appear that argali continue to decline in western and central Mongolia, while populations in eastern Mongolia appear to be expanding. Argali populations in southern Mongolia appear to be relatively stable. Probably no more than a few thousand Altai argali (*O. a. ammon*) persist in Mongolia, while several thousand Gobi argali (the putative *O. a. darwini*) inhabit a growing range in the south and east.

Table 3: Argali population size and density in 2001 and 2009

№	aimag	2001			2009		
		distribution	population size	density (10 km^2)	distribution	population size	density (10 km^2)
1	Bayan-Ölgii	2274.82	650	2.9	4244.3	2123	5.0
2	Bayankhongor	2955.35	290	1.0	3560.8	572	1.6
3	Gobi-Altai	6263.84	380	0.6	6465.1	1556	2.4
4	Gobisumber	9.19	85	92.5	29.0	140	48.3
5	Dornogobi	8315.33	1745	2.1	9671.9	2773	2.9
6	Dundgobi	3991.22	850	2.1	1723.5	2338	13.6
7	Zavkhan	1184.74	110	0.9	1184.7	40	0.3
8	Uvurkhangai	3716.55	1840	5.0	2151.2	1756	8.2
9	Umnugobi	8990.77	4040	4.5	6371.7	2404	3.8
10	Sukhbaatar	120.01	5	0.4	1070.9	*50*	0.5
11	Tov	1296.91	375	2.9	2992.0	834	2.8
12	Uvs	694.12	380	5.5	1315.9	1033	7.9
13	Khovsgol	63.04	30	4.8	613.8	30	0.5
14	Khovd	8028.58	2460	3.1	6369.0	2311	3.6
15	Khentii	828.12	175	2.1	720.6	*180*	2.5

Ibex

Field teams directly observed 162 groups of ibex, totaling 2541 individuals (table 4). On the basis of extrapolation methods described above our point estimate of ibex is 36018 with a lower 95% confidence limit of 13840 and an upper 95% confidence limit of 43873 (table 4).

Approximately 14% of the Sibirian ibex range in Mongolia occurs within federal protected areas, including Altai Tavan Bogd National Park (NP), Gobi Gurvan Saikhan NP, Great Gobi Strictly Protected Area (SPA) sections A and B, Ikh Nart Nature Reserve (NR), Khokh Serkh SPA, Khoridol Saridag SPA, Khustai Nuruu NP, Myangan Ugalzat Nature Reserve, Siilkhem NP, Tsagaan Shuvuut SPA, Tsambagarav NP, and Turgen Uul SPA (Amgalanbaatar et al. 2002). Small populations likely occur in other federal and provincial (aimag) or county (soum) protected areas as well.

Threats to populations of mountain ungulates in Mongolia

The survey documented threats and general conditions both species face. In general, threats and conservation challenges were greater for argali than for ibex. Field teams reported that poaching was minor or absent from most areas surveyed. However, possible biases in reporting this (most poaching was not observed directly, but rather inferred from interviews) must be born in mind. Mining activity with potential to affect argali and ibex populations was reported from some areas;

livestock was present in almost all areas, with its intensity variously categorized as light to heavy. Interpreting threats to argali from this survey should consider teams that field prioritized spending time in areas already known to contain argali. It is possible that human factors have combined to reduce this area of distribution from earlier levels. Some field teams documented a loss of argali completely from areas that we had assumed contained them as of autumn 2009.

Table 4: Ibex population estimates in Mongolia

Aimag	ADUs sampled	line transects sampled	point transects sampled	mapped ADU per aimag (km^2)	ADU subject to survey (km^2)
Bayanhongor	3	37	5649.6	2909	5.1
Bayan-Ölgii	15	249	7522.3	3874	5.1
Dornogovi	-	-	225.5	120	5.3
Dundgovi	14	75	1564.7	1518	9.7
Gobi-Altai	32	314	8917.6	4913	5.5
Hovd	35	1547	13021.5	4532	3.5
Umnugobi	57	204	5309.5	13324	25.1
Uvurkhangai	1	4	2568.9	334	1.3
Tuv	1	11	80.9	15	1.8
Uvs	1	78	1335	1909	14.3
Zavhan	3	22	6078.4	1337	2.2
Arkhangai	0	0	127.86	100	7.8
Ulaanbaatar	0	0	2.1	42	0.0
Huvsgul	0	0	3709.8	1091	2.9
Total	**162**	**2541**	**56113.66**	**36018 (13840-43873)**	**6.4**

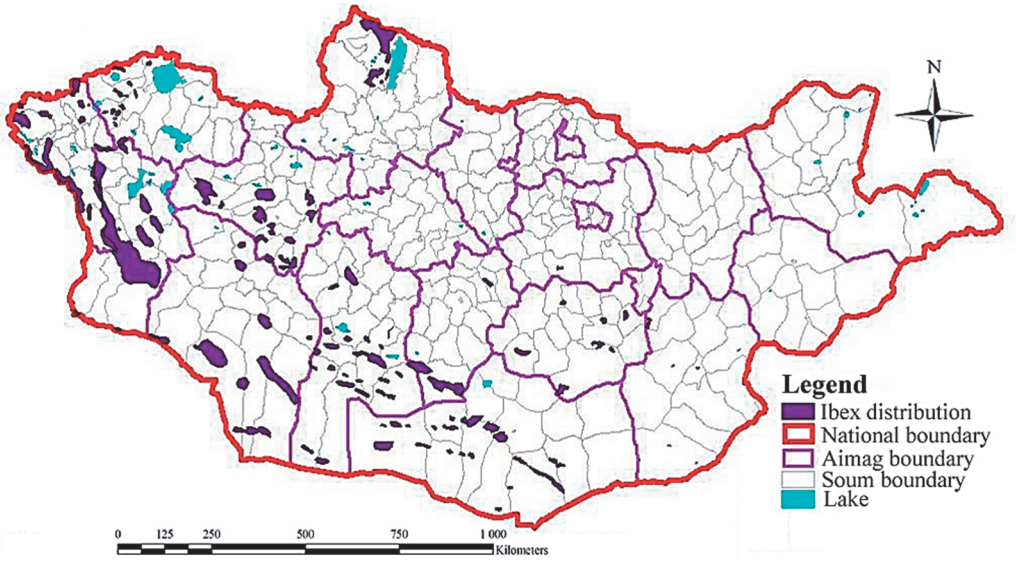

Fig. 5: Ibex distribution map of 2009.

Most field teams reported that drought conditions over the previous two years had influenced both wildlife and domestic livestock. They also reported relatively low numbers of lambs and yearlings, and low numbers of males relative to the number of females. These are causes for concern, but we urge caution in interpretation.

Management actions that prioritize conservation of argali and ibex while simultaneously allowing for local livelihoods are best made on a local scale. We suggest that future monitoring efforts take the form of local scale monitoring, with training and oversight for locals from the national level.

Conclusions and recommendations

The population estimate in 2009 with 26,155 argali is 29.3% higher than that of FRISINA et al. (2007) in 2002, they estimated 20,226 argali in Mongolia. The proportion of lambs observed in 2009 (60 lambs : 100 ewes) was higher as FRISINA & ONON (2007) had counted (29 lambs : 100 ewes in the 2002 survey), which is within the range of 10 to 63 lambs : 100 ewes reported for fall surveys by other authors (FRISINA & BOLDBAATAR 1998, FRISINA & GOMBOSUREN 1999, FRISINA et al. 2004). FRISINA & PUREVSUREN (2010) reported relatively good survival of lambs (47 lambs: 100 ewes) over the 2008-2009 winter. These data indicated improved lamb survival in 2008 and 2009 compared to 2002.

Trophy hunting of argali and ibex is a contentious issue both locally and internationally. Management of argali in Mongolia historically has been tied to improving biological research and anti-poaching activities within the framework of trophy hunting.

In 1967 foreign trophy hunters began to hunt this species in Mongolia and launched the proper exploitation of the species in the country. Since then approximately 2000 Argali and more than 10 000 Ibex have been hunted by foreign trophy hunters, generating certain amounts of income for the state budget and for hunting companies in the country.

In 2000 the WWF Altai Sayan project, in cooperation with the Ministry of Nature and Environment (MNE) and the “Argali” research center, organized a national seminar on Strategic Planning for Conservation of Mongolian Argali Sheep. It was the first effort to assess the status of the conservation and proper exploitation of the species and define future objectives. This workshop resulted in the production of the “Argali Conservation Management Plan” in 2002.

Due to lack of standardized survey methodologies and thus a lack of reliable, updated information on the exploitation of the species, there are difficulties regarding the treatment and comparison of compiled survey data and results and problems with the data entry into the Central Database.

It can be said that there are almost no policies or legal provisions on the proper use and management of wildlife for aimag and sum authorities. Wild species that attract foreign trophy hunters are mostly “rare” species; therefore, their exploitation without any proper conservation management can result in rapid decrease in population resources, further threatening and extinction.

Carefully studying the present status of the argali sheep harvesting system we think that the following issues should be emphasized:

1. The current conservation principles of the argali sheep should be changed. In Mongolia the resource of the Argali sheep was indicated as “rare” by the Government resolution (2001/264) and it is listed as threatened in the Mongolian Red book of threatened and endangered species and included in Appendix II of the CITES and CMS Conventions respectively. Although some parts of distribution areas of the species have been taken under state and local protection, there is still a lack of opportunities to widely carry out conservation activities for the species because of insufficient funds for the management.

   Therefore, one of the best methods and ways to protect the species might be the development of a mechanism that could increase local people’s interests in protecting of Argali Sheep, or, in other words, to offer them sustainable exploitation of the species.

The Argali conservation management should be developed and carried out under the leadership/guidance of the government and the Ministry of Nature and Environment. Wildlife conservation and sustainable exploitation should not be only words in legal provisions but actively implemented.

2. It needs to be improved the regulation and coordination capabilities of the legislative acts relevant to the argali sheep conservation and exploitation. Democratic legislative acts consistent with the constitution need to be developed that define the system of responsibility, on what basis and where trophy-hunting licenses of the species are issued, and what rights and obligations trophy hunters have. In order to achieve this objective some current laws need to be amended and updated, and some new regulations must be developed.

   Trophy hunting management must cover both the species and the land; this should be taken into account when laws and regulations are formed. The best wildlife management is well-developed land management.

3. Hunting licenses should not be issued by the tourist companies, but to the certified hunting companies that are entitled to conduct hunting within certain region(s), and simultaneously carry out conservation activities for wildlife within the region(s). In other words, licenses should be issued only to the hunting areas or region(s) where were done and conducted proper harvesting management, not to the companies in the cities.

Due to weak monitoring processes and increased direct and indirect human impacts on resources, distribution, and habitats of argali sheep in Mongolia, the population of the species has deteriorated and changes to their habitat have occurred.

For instance, Bayan-Ölgii, Bayankhongor, Govi-Altai and Uvs aimags were once widely populated by argali sheep. Now, regrettably, the species is observed only in a few numbers in some places.

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