Summary of reports and other documents,
delivered to World Bank Mongolia office during preparation and
implementation of Mongolian Ungulate' Surveys, which
was supported by the NEMO II project

Public Disclosure Authorized

Introduction

On 23 January 2009, WWF Mongolian Country Office was requested to provide the Ministry (MNET) with comprehensive recommendations to improve wildlife conservation management in the country. The MNET planned to conduct a countrywide population estimation surveys of 5 targeted species (Argali sheep, Sibirian ibex, Mongolian and Goitered gazelle and Wild ass) in collaboration with the WWF Mongolian Country office and the Mammalian Ecology Laboratory of the Institute of Biology, MAS. As part of this comprehensive assessment of these species' population status and development of conservation programs for mountain and steppe ungulates in Mongolia, a nationwide surveys wwere conducted in October, November 2009. Those surveys have been supported by the World Bank and NEMO II project and organized by the Ministry of Nature, Environment, and Tourism, the Institute of Biology, MAS and WWF Mongolian Country Office.

Following are the summaries of the reports and documents which were prepared during preparation and implementation of the survesy by Mammalian Ecology Laboratory and delivered to the WWF Mongolian Country office, MNET, NEMO II project office, including final reports of surveys approved at the Scientific Council of the Institute of Biology, recommendations for conservation, sustainable use of ungulates in Mongolia, optimal methodology to conduct a regular population monitoring surveys of game species, reporting on the analysis of collected data related with distribution, population size and threats on grey wolf, red and corsac foxes.

2. Assessment of the mountain ungulate's population

2.1.Study scope

After 2 training and organization workshop (were hold in March and in September 2009), eleven field teams conducted field surveys 21 days each in 12 aimags (provinces) of Mongolia.

Were sampled and studied total 134 argali distribution units within Mongolia, which were occupied approximately 46,603 km^2 of the total 60,237 km^2 of previously mapped disribution of argali. In addition to 20 line transects (10-20 km each) were run, and observations were made from the top 857 fixed points (Table 1) to collect the data for population estimation of ungulates.

Table 1. Sampled Argali distribution units (ADUs, previously mapped by IOB), number of line transects and fixed points for observations of argali and ibex during the October 2009 survey of mountain ungulates in Mongolia. Also the cumulative area of ADUS are shown within each aimag, and the area of those surveyed.

Aimag	ADUs sampled	Line transects	Point obsrvations	Mapped ADUs in aimag (km^2)	ADU subject to survey(km^2)
Bayanhongor	12	0	50	3561	4,393
Bayan-Olgii	9	0	59	4749	4,383
Dornogovi	13	14	67	9282	5497
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**	**50215.4**	**46603**

The teams' additional objectives were to update our understanding of the distribution of argali and ibex in their respective aimags, collect direct and 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. Total, 48 biologists, park specialists, and rangers were participated in the field surveys.

2.2.Methodology

To reduce possible bias, areas previously mapped as containing argali (argali distribution units, ADUs) were prioritized for survey using a randomization scheme that favored larger over smaller areas (but was otherwise was objective with regard to habitat conditions, previous knowledge of animal density, and ease of access). 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 field work, 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 as point transects, to estimate the density of argali and ibex. We estimated abundance on an 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.

2.3.Study results

Field teams directly observed a total of 385 groups of argali, totaling 3373 individuals (Table 2). On the basis of extrapolation methods described above (and in more detail in the Method's section in the main report), resulted as a argali population of Mongolia have 18140 individuals (9037-48146 animals with 95% cl), (Table 2).

Table 2. Argali sheep observed directly, and population estimates, October 2009, Mongolia

Aimag	**Observed directly**		**Abundance estimate**		
	Groups	**Animals**	**Point estimate**	**Lower 95% CL**	**Upper 95% CL**
Bayanhongor	15	143	572	444	927
Bayan-Ulgii	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
Uvurkhangai	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**	**9037**	**48146**

Field teams were directly observed a total of 162 groups of ibex, totaling 2541 individuals (Table 3). On the basis of extrapolation methods described above (and in more detail in the Methods section of the main report), is estimated to be 36018 ibex in Mongolian population with 13840-43873 animals 95% lower and upper confidence limit (Table 3).

Table 3. Ibex observed directly, and population estimates, October 2009, Mongolia

Aimag	Observed directly		Mapped IDU in aimag (km2)	Abundance estimate	
	Groups	Animals		Point estimate	Density
Bayanhongor	3	37	5649.6	2909	5.1
Bayan-Ulgii	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**

The survey documented threats and general conditions which 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 at 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 was reported from some areas; livestock was present in almost all areas, with its variously categorized intensity as light to heavy. Interpreting threats to argali from this surveys should consider that field teams 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 had assumed contained them as by autumn 2009.

Most field teams reported that drought over the previous year or two had to influence both wildlife and domestic livestock. Most field teams reported relatively low numbers of lambs and yearlings, and low numbers of males compare 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 from the national level.

3. Assessment of the steppe ungulates population

3.1.Study scope

Line and road transects surveys for Mongolian gazelle *Procapra gutturosa*, goitered gazelle *Gazella subgutturosa* and khulan *Equus hemionus* were conducted across south-eastern Mongolia in November/December 2009. During an intensive two-day workshop in November 2009 the field teams were trained in distance sampling methodology and the survey design was further amended to take into account known obstacles in the field.

A stratified line transect survey design with four tenths of a degree spacing (approx. 30.2 km) between the 93 transects giving approximately 20,000 km of total effort was selected as this provided sufficient replication per survey stratum and a reasonable amount of survey effort (given the potentially low encounter rates for some of the target species), while taking account the constraints of the survey (number of survey teams and available survey time). The transects were oriented in a north-south direction to facilitate their coverage in the field and avoid potential problems in sightability due to glare. The spatially extensive distance sampling survey covered 79 line transects with a combined length of 14,070.7 km in a region of approximately half a million square kilometers.

Table 4. *Details of size of the survey strata, number of transects (k) total effort (L)*

Stratum	**Area (km2)**	***k***	**L (km)**
Dornod	113180	19	3661.1
Suhbaatar	82153	13	2015.0
Dundgovi	75137	11	1719.3
Southern Tuv-Khentii northeastern-Dornogovi	101968	20	2469.1
Southwestern Dornogovi eastern Umnugovi	131526	16	4206.2
Total	503964	79	14070.70

Ten survey teams completed the line transects and road surveys by vehicle during an approximately two week period from the end of November till the beginning of December 2009 (note that non-random road surveys were used due to the difficulty of the terrain in the western portion of the region of interest; these data were not used for the distance sampling analysis, but Mongolian Ungulate Terrestrial Survey Report, Jan 2010 were included when examining the spatial distribution of the target species). Transects were driven during daylight hours and GPS receivers were used for orientation and to obtain positional information on observations of the target species.

Taking into account the likely distribution of the target species (Mongolian gazelle *Procapra gutturosa*, goitered gazelle *Gazella subgutturosa* and khulan *Equus hemionus*), as well as the information required for their future management, the survey region was stratified by aimag (Dornod, Sukhbaatar, Dornogovi, Dundgovi) or combined portions thereof (southern Tuv-Khentii, eastern Umnugovi-Uvurkhangai).

3.2. Methodology

Distance sampling methods have been used in order to estimate density and abundance of these species from line transects in a substantial portion of area covered during the survey. In addition, the location of each observation made from line or road transects both on- and off-effort was recorded to develop an understanding of plains ungulate distribution in south-eastern Mongolia.

Distance sampling surveys along line transect are widely used for estimating density and abundance of ungulate populations.

During the survey observers move along each line, recording any animals detected within a distance w of the line (w can be infinite), together with their shortest distance from the line. Frequently, instead of recording the perpendicular distance (x) between the line and the center of the group, it is easier to the record the radial distance (r) from the line to the center of the group together with the angle (q) between the transect line and the line of the detection. Then later during analysis perpendicular distance can be calculated as $x = r \sin(q)$. These distances are used to estimate a detection function, which gives the probability that an animal is detected, as a function of distance from the line. In the case of ungulates that occur in groups, the unit of observation is the group and thus the distance to the center of the group, as well as the group size is recorded.

To ensure valid statistical estimation of abundance within the survey region requires random placement of a sufficient number of transect lines throughout the survey region so that the sampled area is representative of the whole survey region.

Various combinations of key functions and adjustment term were considered to model the detection function (*e.g.*, uniform + cosine or simple polynomial, half-normal + cosine or simple polynomial, hazard rate + cosine or hermite polynomial). Goodness of fit tests were used to identify violations of assumptions. Exploratory analyses were conducted to examine options for truncation and grouping intervals to improve model fit for the detection function and in the final models data were grouped for final analysis using 5 equal-spaced intervals for all species with right truncation at 1000 m (PG), 3000m (GS) and 4000 m (EH). Akaike's Information Criterion (AIC) was used in final model selection, with particular attention paid to model fit at distances near zero, which is most import for robust estimation.

Finally, applying equation 1 (shown above) density estimates (D) for each target species are obtained by combining estimates of $f(0)$, encounter rate (n / L), and expected group size $E(s)$. The latter parameter is omitted to obtain density estimates of groups ($s\,D$) for each target species. The density of individuals D is multiplied by the surface area of the survey stratum to obtain the corresponding abundance estimate (N).

Density of ungulates of a particular species within the area surveyed is estimated as:

$$\hat{D} = \frac{n\hat{f}(0)\hat{E}(s)}{2L}$$

where L denotes the aggregate length of the transects, n is the number of groups observed, f (0) is the probability density function of observed perpendicular distances evaluated at zero distance from the line, and $E\hat{}$ (s) is the estimated expected group size (Buckland *et al.*, 20011).

The density of individuals is multiplied by the surface area of the study area or survey stratum to obtain the corresponding abundance estimate of ungulates of a particular species ($N\hat{}$).

3.3.Study results

During the spatially extensive two week survey the largest proportion of sightings made across the entire region covered was of Mongolian gazelle *Procapra gutturosa* (65.37%), whereas goitered gazelle *Gazella subgutturosa* were observed less frequently (28.41%) and observations of khulan *Equus hemionus* were the most rare (6.22%). Although the encounter rates for Mongolian gazelle was higher in Sukhbaatar than Dornod, the extremely large groups observed in the latter aimag gave estimates of almost 5 million animals in Dornod compared to less than half a million in Sukhbaatar. Large numbers of this species were also estimated for southern Tuv-Khentii and northeastern Dornogovi. Together with the estimates for the remaining survey strata this gave a total abundance estimate of 5724880 (95% confidence interval 3387466-9836377) corresponding to a percent coefficient of variation of 48.15%. Given the extreme variability in group sizes for Mongolian gazelle, this was the largest contributor to the variance in the density and abundance estimate (76.8%), compared to the contribution to this variance from the variance in encounter rate 22.7) or detection probability (0.5%).

Table 5. Assessment of the population size and density of Mongolian gazelle

Stratum	**D ($\hat{D}_s$)**	$\hat{N}$	**(%CV)**	**95% CI**
Dornod	44.127 (0.014)	4994300	25.78	(3016100-8269800)
Suhbaatar	5.205 (0.060)	427600	23.63	(265660-688280)
Dundgovi	0.2066 (0.0039)	15523	70.91	(3993-60352)
Southern Tuv-Khentii northeastern-Dornogovi	2.756 (0.0075)	281030	55.16	(99978-789940)
Southwestern Dornogovi eastern Umnugovi	0.04 (0.0012)	5308	88.21	(1081-26074)
Southern Uvurkhangai-Umnugobi northern	0.24093	1124	25.24	(654-1931)
Total	**8.7**	**5724885**	**48.15**	**(3387466-9836377)**

Estimates of density (D$\hat{}$) in number/km2 (group density s D $\hat{}$ in parentheses) and abundance (N$\hat{}$) for each survey stratum and overall with their corresponding percent coefficient of variation (%CV) and 95% confidence intervals (95% CI) for N.

For goitered gazelle the largest abundance estimates were obtained for southwestern Dornogovi and eastern Umnugovi, as well as southern Tuv-Khentii and northeastern Dornogovi (with a substantial number also in Sukhbaatar). The total abundance estimate was 11978 (95% CI 6458-25035) corresponding to a percent coefficient of variation of 49.93%. The variance in encounter rate was the largest contributor to the Mongolian Ungulate Terrestrial Survey Report, Jan 2010 variance in the density and abundance estimate (93.9%) compared to the relatively small contribution to this variance from the detection probability (1.2%) or group size (4.9%).

Table 6. Assessment of the population size and density of Goitered gazelle

Stratum	**D ($\hat{D}_s$)**	$\hat{N}$	**(%CV)**	**95% CI**
Dornod	-	-	-	-
Suhbaatar	0.0161 (0.0024)	1324	66.56	(377-4652)
Dundgobi	0.0002 (0.0002)	15	100.87	(2-97)
Southern Tuv-Khentii northeastern-Dornogovi	0.0544 (0.0003)	1300	103.80	(934-1511)
Southwestern Dornogovi eastern Umnugovi	0.039 (0.0028)	5103	47.97	(2027-12849)
Western Umnugovi	0.01	2778	10.67	(2250-3430)
Southern Uvurkhangai-Umnugobi northern	0.05640	144	26.38	(83-251)
Southern Bayanhongor	0.01356	419	12.99	(322-545)
Southern Gobi-Altai	0.0702	895	30.21	(463-1730)
Total	**0.0324**	**11978**	**49.93**	**(6458-25035)**

Estimates of density (Dˆ) in number/km2 (group density s D ˆ in parentheses) and abundance (Nˆ) for each survey stratum and overall with their corresponding percent coefficient of variation (%CV) and 95% confidence intervals (95% CI) for N.

The high numbers of khulan were observed in southwestern Dornogovi and eastern Umnugovi distance sampling survey stratum. With a relatively low estimates of group and individual density this gave an abundance estimate of 14051 (95% CI 7799-38163) corresponding to a percent coefficient of variation of 31.4%, where the variance in encounter rate was the largest contributor to the variance in the density and abundance estimate (69.6%) compared to the contribution to this variance from the detection probability (4.5%) or group size (25.8%).

Table 7. Assessment of the population size and density of Wild ass

Stratum	D	$\hat{N}$	(%CV)	95% CI
Southwestern Dornogovi eastern Umnugovi	0.085	11187	53.47	(4012-31196)
Southern Bayanhongor	0.0362	393	34.17	(167-925)
Southeastern Gobi-Altai	0.0587	376	16.88	(268-528)
“B” part of the GGSPA	1.7	2095	20.04	(1675-2515)
Total	**0.469**	**14051**	**31.14**	**(7799-38163)**

Estimates of density (Dˆ) in number/km2 (group density s D ˆ in parentheses) and abundance (Nˆ) for each survey stratum and overall with their corresponding percent coefficient of variation (%CV) and 95% confidence intervals (95% CI) for N.

For Mongolian gazelle these maps highlight the high densities observed in the eastern steppe and the large group sized observed in Dornod. For goitered gazelle these maps highlight southern Sukhbaatar and southern Dornogovi, and especially Umnogovi, as well as to a lesser extent Govi-Altai and Bayankhongor. For khulan southern Dornogovi and western Omnugovi were highlighted and to a lesser extent southern Govi-Altai and Bayankhongor.

These survey results for this extensive region provide extremely important information for the successful future long-term management of these species in Mongolia.

4. Recommendations for conservation of mountain ungulates

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.

However, the issuance of licenses to trophy hunters and harvesting management are the same as they were during the former socialist period and lack of mechanisms to increase the local people's conservation interests, especially in case of Argali.

After Mongolia's transformation to a democracy and free market economy in the early 1990s led to several changes with ramifications to argali. Although the government policies taking numerous measures to ensure the sustainable growth and reproduction of argali sheep (*Ovis ammon*), Ibex (*Capra sibirica*), adverse impacts such as the illegal hunting, illegal trade of raw materials of wild animals and influence of the weather conditions are constantly increasing. In some parts of the distribution of these animals, mining activities are taking place and herders with livestock are increasingly settling whether temporarily or permanently in form of pastureland rotation creating overlapping of pastures for livestock and wild animal habitat and consequently, the wild animals' habitats are deteriorating, they are pushed away from their habitats, their normal breeding and reproduction processes are jeopardized and their population sizes are reduced rapidly.

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 current 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. Unfortunately, this plan has not been implemented to date.

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 with 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 a “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. 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 should be 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 should 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 to 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 city.

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

For instance, Bayan-Olgii, Bayankhongor, Govi-Altai and Uvs aimags were once widely populated by Argali Sheep. Now, regrettably, the species is seen only in a few numbers in some places.

4. Any activities relevant to the issuance of the harvesting licenses and exploitation of wildlife should be carried out and performed with the scientific basis and within the legal framework. The Mongolian Law on Environmental Protection (1995) points out that it is necessary to use scientific research to guide the proper use and protection of natural resources, to make apparent decisions and carry out activities, and to ensure environmental balances through ecologically sound economic development. The government establishes the Argali hunting quota based on the recommendation of the MNE. Regardless of the decline of the species, the government intends to pursue a plan to earn income from Argali hunting. For instance, the quota of this year is over scientific organization's recommendation. The justification for the establishment of Argali hunting quotas should be based on the harvesting management report, not on the species resource assessment. This current policy contradicts the Hunting Law. Hunting management is able to give a more scientific recommendation on how to use or protect wildlife. The resource assessment only shows the statistics on the current statement of the population, disregarding many factors like the size of the population in the past.

It is appropriate that hunting should be done within certain area(s) and quotas for hunting and use of species should be based upon statistics from harvesting management reports and recommendations from the area(s).

5. Rams are sold for the high prices that would cover all expenditures related to their conservation and restoration, as well as costs occurred during the harvest and the costs of planning and implementing conservation management. Unfortunately, this possibility is still not used

properly. It is not going beyond the private benefits of people who are just interesting to hunt and sell it. The government resolution (264/2001) has established standard costs for the trophy hunting of Argali: US $ 20.000 (of which: 14.000 is for the payment and 4.000 is for the fee) for Altai Argali, and US$ 10.000 (of which: 7.000 is for the payment and 2.000 is for the fee) for Govi Argali. However, in practices, more income is generated for the hunters by selling the trophy to foreign hunters for much higher prices.

If the sustainable use of this species is not promoted, a number of illegal exp;oitation of the species will occur. Because certain apportions of Argali hunting are not allocated to local communities, there is an incentive for people to try to benefit from hunting the species rather than protect the species. However, if the majority of actual market prices for hunting were used and that money was invested in improving the living environment of local communities, the local communities would be more inclined to protect the species in order to ensure the sustainability. The legislative environment should be set up so such initiatives can be realized. It is thus necessary to make legal statements regarding the allocation of certain parts of income to serve the needs of local communities.

Additionally, certain amounts of income should be spent on the conservation of population and implementation of harvesting management. Payments are made to the state budget and it is legally stated that a certain percentage of it should be spent on environmental conservation. However, as of yet, nothing has been spent on the study and management of Argali Sheep.

6. All of the relevant information on Argali exploitation and conservation should be open for public and used for awareness and research purposes. Information on hunting, protection and exploitation of other rare species should be compiled in one place, updated regularly, and widely used. However, there is still a lack of available information on the exploitation of Argali. For instance, right now it is necessary to plan conservation measures and activities based on analyzed data and information on numbers, dates, morphological measurements / dimensions and trade prices of hunted species. Unfortunately, no such Information Databank has been established. Therefore, a state hunting registration agency should be established as well as procedures to prohibit the export of trophies that are not registered by the agency.

5. Other animals, were observed during the surveys

During the population assessment of hunting mammalian species, some data on distribution, population size and threats on grey wolf (*Canis lupus*), red (*Vulpes vulpes*) and corsac foxes (*Vulpes corsac*) were collected. The occurrence of red fox and grey wolf was high. Especially red and corsac fox were occurs abundant in pasture degradation area with high numbers of Brant's vole. During the surveys, 16 grey wolves, 40 red foxes, and 6 corsac foxes were registered.

The data of carnivores only registered during the steppe and mountain ungulates. Therefore it need to collect data for carnivores by special methodology, because they are nocturnal animals.

6. Optimal methodology to conduct a regular population monitoring survey

One of contract duties for population assessment of the Mongolian ungulates were developing of a optimal methodology to conducting regular monitoring surveys of the these vulnerable species population. The methodology for regular monitoring surveys for steppe and mountain ungulates and carnivore population were prepared and distributed.