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Kulan (*Equus hemionus* Pallas 1775) in Turkmenistan

V.S. Lukarevskiy & Yu. K. Gorelov

Abstract

The kulan (*Equus hemionus kulan*) is the only odd-toed ungulate left in the wild in northern Eurasia. In the 1930s, the kulan survived in Southern Turkmenistan only. In the 1940s, kulans were found only in an area named Badkhyz in Turkmenistan. To conserve the last natural population of this subspecies of kulan the Badkhyz Natural Reserve was established in 1941. The historical and contemporary distribution, fluctuation in numbers, conservation and scientific research of kulan populations in the Badkhyz Natural reserve are reviewed in this paper.

Key words: conservation, distribution, kulan, population, Turkmenistan

Introduction

The historical range of kulan includes the steppe regions of Europe and Asia. Within the borders of the former USSR, kulans inhabited semi-deserts, steppes, and forested steppe areas in historic times. The northern border of the kulan's range was at the latitude of Kiev. The range extended northwards to 51-52°N and bordered the Black and Caspian Seas and the Caucasus in the south. The main reduction of the range occurred between the 1st and 15th century. In the Volga-Ural interfluvial area, kulans were sighted up to the 19th century (KARELIN 1875, quoted from SOLOMATIN 1973). The part of the range located in Kazakhstan and Central Asia diminished greatly in the 19th century (SOLOMATIN 1973). In the 19th and early 20th century, the kulans still inhabited the eastern coast of the Caspian Sea from the Atrek River in the South to the Mangyshlak Peninsula in the North (GEPTNER et al. 1961). They were abundant in the Krasnovodsk area and near the Bolshoi Balkan (LAPTEV 1934) even in the 1880s. VAMBERI (1865) refers to the presence of numerous Wild Asses in Northwestern Turkmenistan in 1863. Kulan herds were encountered even more eastern, at the Lake Syrykamys in 1873. In north-western Turkmenistan, the last kulans have apparently vanished in the 1930s (ISHADOV 1972). Kulans also inhabited the whole Kopet Dagh piedmont plain. Here, in the area of Kizyl-Arvat and Geok-Tepe, they could even be seen from a train window (MASALSKY 1913). In the western part of Kopet Dagh, kulans occurred up to the 20th century.

Badkhyz in Turkmenistan is the only region where a native population of the true kulan (*Equus hemionus kulan*) survived. Animals from Badkhyz have been introduced to Kazakhstan, Uzbekistan, and to four reintroduction sites in Turkmenistan. New populations were established by releasing small groups of founders, which inevitably led to decreasing genetic variability. Only the Sarykamish population was based on a sufficient numbers of founders.

Currently, Turkmenistan supports the only healthy natural population of the kulan *Equus hemionus kulan*, and carries the full responsibility for their conservation.

The first field studies of the Badkhyz population of kulan were started by M.P. ROSANOV in 1935 (ROSANOV 1937, 1940) and G.I. ISHUNIN in 1939 to 1941 (ISHUNIN & KOROVIN 1945). They formulated the task of designating the Badkhyz area as a strict nature reserve. After the reserve was established in 1941, studies on kulans were continued by the staff of the reserve's research department. V.G. GEPTNER was the first researcher in the reserve in 1942 and paid much attention to kulans (GEPTNER 1948, 1956). Later E.I. SHCHERBINA conducted research on kulan (SHCHERBINA & KRAVCHENKO 1960). A.O. SOLOMATIN (1973) thoroughly studied the biology of this sub-

species. Yu.K. GORELOV (1978, GORELOV & ISHANOV 1995) focused on conservation aspects of kulan ecology. V. BOJKO (1984) studied the causes of kulans' massive deaths and also capture techniques, and V.I.KUZNETSOV (1981) studied the dynamics of the Badkhyz population. Research on the Badkhyz kulan has been summarized in a number of review publications: on ungulates in the USSR (GEPTNER et al. 1961), on ungulates of Turkmenistan (GORELOV et al.1995), and specifically on the kulan (SOLOMATIN 1973; BANNIKOV 1981; DENZAU & DENZAU 1999).

Zoological studies eventually led to designation of the Badkhyz Nature Reserve. Moreover, these investigations formed the scientific bases for reserve administration and ranger work on the protection and restoration of the kulan population, the conservation of its habitat, and of the whole natural ecosystem of Badkhyz.

Materials and methods

Our data were collected over 20 years from 1985 till 2005. At the beginning we carried out our observations at a place named "Kulan's plateau" in the Badkhyz reserve where more than 1500-2000 kulans were observed. In 1989-1990 we took part in the annual census. In 2001 a year-round monitoring was organized in the Badkhyz reserve and in Meana-Chaacha. In 2002 on 2006 we surveyed all re-introduced populations of kulans in Turkmenistan (fig. 1.)

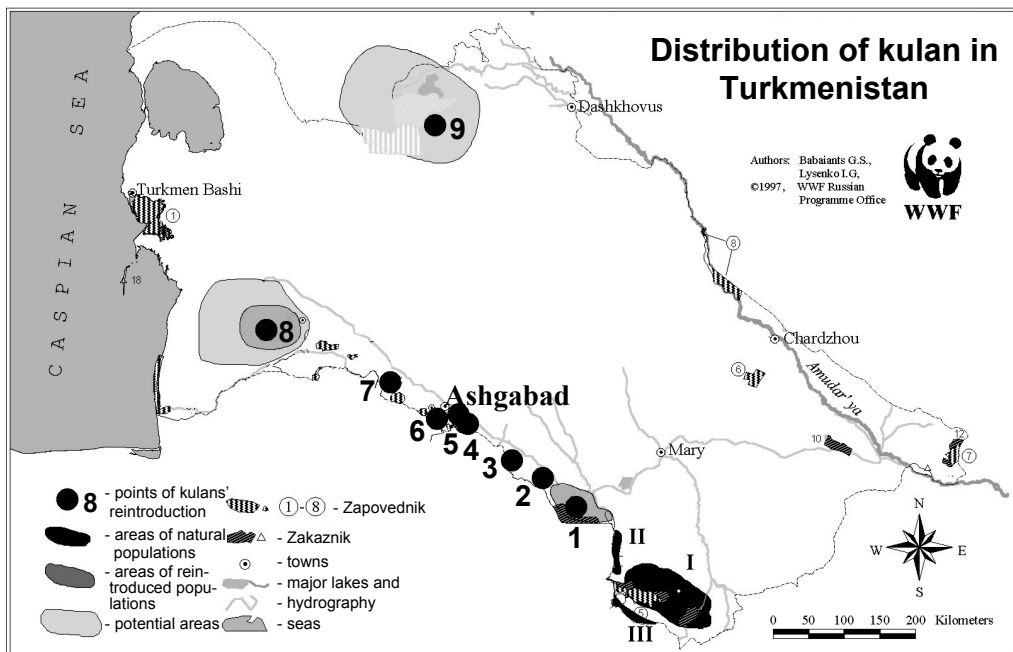


Figure 1: The distribution of *Equus hemionus kulan* in Turkmenistan.

Census methods

Our approaches to estimating the numbers of kulans were based on methods developed by ROSANOV (1937, 1940), GEPTNER (1948, 1956), SHCHERBINA & KRAVCHENKO (1960), GORELOV (1978).

E.I. SHCHERBINA and A.N. SUKHININ conceived the basic idea of counting kulans at sites where they concentrate around water sources, which resulted in an effective counting method eventually being developed. A.O. SOLOMATIN counted kulans by combing the areas of con-

centration with a chain of counters in 1958. Effective aerial counts of kulans at watering sites from a MI-2 helicopter were carried out by Yu.K. GORELOV between 1962 and 1976. Between 1977 and 1986, land-based counts were carried out: mapping of animals along the counting routes with subsequent extrapolation taking potential visibility conditions determined by micro-relief into account (KUZNETSOV 1981). A.S. SHAPOVALOV carried out aerial counts from an AN-2 plane from 1987 to 1992 (Nature Chronicles of Badkhyz zapovednik, 1987-1993). Counts at watering places by scouring the area with cars and a motor-cycle were realised by Yu.K. GORELOV and I. ISHANOV in the years 1998 and 2001 (GORELOV & ISHANOV 1998).

Our basic method of census was the following: We counted kulans near water sources or at winter pastures where animals massed up during bad weather. Before censuses, we carried out preliminary inspections of the territory with 3-4 groups of rangers and located the largest groups of animals. *Census at water sources* included also preliminary inspection of all available springs. We also questioned the shepherds about available water sources and afterwards counted all kulans visiting these.

Census at winter pastures: Low temperature, snow and strong winds force kulans to mass in depressions and along snow-free slopes. Three groups took part in winter censuses. Each group was responsible for counting at a defined site of winter pasture. We counted animals and their tracks.

Results and discussion

Natural habitats - distribution and numbers in Turkmenistan

The distribution of kulans depends on the presence of accessible pastures and watering places. In order to get sufficient supplies of forage and water, kulans usually make seasonal migrations.

In the 1930s the kulan survived in Southern Turkmenistan only in the area between the village of Dushak and the Tedzhen River, in Badkhyz, and possibly in Karabil. In the 1940s they were only left in Badkhyz.

Based on a detailed analysis of the kulan distribution in Turkmenistan, and taking into account contemporary socio-economic developments, founding of new groups of kulans has started (fig. 1). Over the first ten years (1979-1989) about 200 kulans were translocated from Badkhyz to 9 points of reintroduction within the historical range of the species in Turkmenistan. Only one translocation was not successful (Germab, point 7 – fig. 1.), all others developed into free-ranging populations, and the total number of animals reached more than 1,000 in 1994-1995 (PERELADOVA et al. 2002).

The largest reintroduced subpopulation in Turkmenistan now is the Sarykamysh group, which currently numbers between 250 (ARAZOV et al. 2000) and 350 individuals. This estimate was supported by V.I. KUZNETSOV, who counted 213 animals in the area in autumn 2002 (information provided by WWF).

In 2005, a second survey was conducted in Northern Turkmenistan, and two groups of kulans - 31 animals in total - were registered along a 15 km route. In another part of the area, traces of two other groups were registered, numbering more than 40 animals. Thus, short-term surveys proved once more that the estimates of 250-300 animals kulans in this region were realistic.

Another viable subpopulation is the Meana-Chaachinskaya one, which comprised 600-800 animals ten years ago. The counts carried out by V. LUKAREVSKY and A. TARABRIN in 2001 to 2003, and 2005 suggested that approximately 150 animals have survived up to the present.

The Western Kopetdagh subpopulation is one of the most promising with respect to habitat capacity and low threats of potential conflicts with farmers. At the beginning of the reintroduction activities, the population grew rapidly (KUZNETSOV 1990, PERELADOVA & KUZNETSOV 1997). In the late 1990s, the subpopulation became subjected to intense human pressure (KUZNETSOV 1999). Only 10 animals were traced during the survey carried out by V.I.

KUZNETSOV in 2003 (WWF data). Most likely, the total number of kulans currently does not exceed 20 to 30 individuals.

The Kalininskaya group located in the Central Kopetdagh piedmonts numbers 25 to 30 kulans (according to information acquired from the Kopetdagh Nature Reserve's data and our own surveys in autumn 2005 and spring 2006).

A detailed analysis of kulan's distribution in the last natural area - in Badkhyz - was made by GORELOV & SHAPOVALOV (1995). Their review of information found in the literature (ROSA-NOV 1937, ISHUNIN & KOROVIN 1945, GEPTNER 1956, SHCHERBINA & KRAVCHENKO 1960, SOLOMATIN 1973) and archives (fieldwork reports by ROSANOV 1935 and ISHUNIN 1939-1941), plus unpublished reports of the Badkhyz Nature Reserve suggests that the distribution of Badkhyz kulan between the second half of the 1930s and the first half of the 1950s was as follows: The animals concentrated in the central areas of Badkhyz and descended to the Eroilanduz and Western Namak Saar depressions when snow fell. The pasturing of Afghan livestock at Turkmen Badkhyz which caused wildlife-livestock competition for forage and water, was stopped in the late 1930s, and the competition between kulans and sheep fell to moderately intense levels. In summer, the animals visited watering places at the Tedzheb River between Pul-Hatum and Naurzubad and at the Egri-Gek River (including its course in Afghanistan). On the Kushka bank, they were found in the Chemen-i-Bid area. In Central Badkhyz, animals used several springs located in the Western Namak Saar and Eroilanduz basins and at the Kizyldzhar gully. However, the discharge of these springs was low, the water was highly mineralized, and they were also used by goitred gazelles - plentiful at that time - and wild sheep. This prevented kulans from staying in the area at any detectable numbers over the entire summer (fig. 2.)

Poaching was the major factor constraining the distribution of kulans in the pre-war years. Scared animals avoided water points where they could meet domestic livestock. The establishment of the Badkhyz Nature Reserve and organization of strict protection over the area helped to increase the kulan concentration on the Kushka bank near the village where the reserve's administration was located.

Kulan distribution between the second half of the 1950s and the first half of the 1960s

During the wet season including autumn (after the first rains fell), winter, and spring, the animals stayed in the central part of Badkhyz on the plateau situated in the desert-steppe part of the nature reserve and to the east of the Kizyldzhar gully. They also visited the northern slopes of the Duzenkyr chain (fig. 2). In the snowy winters, kulans concentrated in the western Namak Saar and Eroilanduz depressions where snow does not persist for a long time (GORELOV 1959; SOLOMATIN, 1973). In the early summer, towards the end of the growing season, the animals migrated to their watering places at the Kushka and Tedzhen Rivers. Their migration routes passed along the Duzenkyr chain, north of the Tezekuyu and Tashkuyu collective farms (Chemen-i-Bid state farm) and reached the Kushka River between the village of Chemen-i-Bid and Pobeda state farm. The grazing areas were located 2 to 6 km (maximum of 15 km) northwest of the watering points. On the Tedzhen bank, kulans drank water from the river upstream and downstream of the village of Shirtepe moving away from the water up to at maximum distance of 15 km.

Some changes in the kulan distribution caused by increasing human impact were noted in the late 1950s. A large summer group of kulans assembled around the Kerlek spring and pistachio woodland in the nature reserve in 1958. The formation of that group resulted from the fact that during 1954 to 1957 the 'Zoocentre' catcher team caught kulans with nets placed at the Tedzhen watering point; animals were driven into the nets with the help of shooting. This did not, however, help scaring them away from this watering place (GORELOV 1970, SOLOMATIN 1973). Another reason was an increase in the total numbers of kulans. During a few years after 1958, there was an active exchange of animals between the Tedzhen and Kerlek summer groups depending on the level of human impact and availability of water. Single, usually old or ill animals spent the summer near the Yer-Oilan-Duz springs.

Migration and seasonal distribution of kulans in Badkhyz in 1930-2005



Initial scheme after GORELOV (1978)










- | | | | |
|---|----------------------|---|------------------------|
|  | - state border |  | - potential habitats |
|  | - Zapovednik border |  | - watering places |
|  | - cliffs |  | - winter grazing areas |
|  | - spring | | |
|  | - river | | |
|  | - seasonal migration | | |

Fig. 2: Migrations and seasonal distribution of *Equus hemionus kulan* in Badkhyz 1930-2005.

Changes in distribution and migrations in the second half of the 1960s

In 1965 to 1967, young kulans were caught on the plateau east of the Kizyldzhar gully; these animals were introduced to new sites (GORELOV 1977). As a result of this activity, kulans avoided this area during the wet season in 1968 staying mainly within the reserve. Migrating east to the Kushka River in early summer, they circumvented the threatened area on the south. The catchers moved to the Kushka left bank, to the pastures between the village of Chemen-i-Bid and Pobeda state farm. This resulted in most animals from the Kushka summer group moving southwards to the Kushka-Egri-Gek interfluvial area. There was yet another reason for utilising new pastures on the Kushka left bank upstream of Chemen-i-Bid (fig. 2). In the 1960s, up to 40,000 sheep were brought for wool-cutting to the Kushka bank downstream Chemen-i-Bid in late summer. This time, kulans moved to Afghanistan along the Egri-Gek River, and then returned to the nature reserve at the end of the dry season. Their return movement was blocked in autumn 1969 by a fence erected along the national border for sanitary and other purposes. Over 100 kulans were not able to return to Central Badkhyz. Over time these animals moved through Iran to the Pul-i-Khatum area on the right bank of the Tedzhen River.

Distribution and migrations in the 1970s

As a result of the described events, two isolated subpopulations of kulan developed in Badkhyz in the late 1960s. The Central Badkhyz subpopulation inhabited the desert-steppe part of the nature reserve, and did not go far outside this area during the wet season. In snowy winters (e.g. 1971/72, 1973/74), kulans concentrated in the Eroilanduz basin, as the whole of Western Namaksaar basin including the reserve's territory (a narrow strip along its northern cliffs) was covered by sheep from the Pogranichnik state farm, and wildlife was practically forced out of the area in this quite critical period (GORELOV 1978).

During the summer months, over 80 % of the Central Badkhyz herd migrated to the left bank of the Kushka River. Their route extended to the south of the Tezekuyu and Tashkuyu collective farms. Most animals grazed in the Kushka-Egri-Gek interfluvial area located upstream of the village of Chemen-i-Bid. A few dozens used the pastures to the north of Chemen-i-Bid where all kulans migrating to the Kushka River had grazed earlier.

Up to 20 % of the Central Badkhyz subpopulation used the Kerlek spring in the pistachio woodland of the nature reserve in the summer. Animals visited the Eroilanduz basin only at the end of the dry season. The Western Namaksaar spring was used by single animals only.

The Western Badkhyz herd migrated to the area between Pul-i-Khatum and Shirtepe on the Tedzhen right bank for the summer. In winter, the herd dispersed widely along the river, sometimes going up to the Western Badkhyz Mountains. Some animals went as far as the village of Akrobat (fig. 2). Relatively few changes in the distribution of kulans were noted in 1976, compared with 1971-1975. The animals returned to the grazing area located to the north of Chemen-i-Bid and inhabited the area to the east of the Kizyldzhar gully in the wildlife reserve.

Distribution of kulans in Badkhyz in the second half of the 1980s

Over many decades, the railway presented an almost impenetrable barrier for the dispersal of kulans to the hilly grassland on the right bank of the Kushka River. Only rarely, single animals or small groups were sighted there (e.g. in 1963). From 1979 on, kulans got used to crossing the railway, as well as the concrete road between the villages of Morgunovsky and Chemen-i-Bid (BOZHKO 1984). This marked the beginning of their spread to the important grazing areas along the Kushka right bank.

An increase in the area of kulan's summer pastures was also noted in other localities. Animals more often used artificial water points and wells established within the reserve. In the second half of the 1980s, they regularly visited the watering places of livestock on the lands of collective and state farms and around the nature reserve.

As the population grew, new wintering areas were inhabited. For one example, 350 kulans were registered in the Kushka-Egri-Gek interfluvial area on 12th December 1988. Because the census carried out that day covered around 60 % of the area, it may be safely suggested that the total number of kulans wintering in the area was between 500 and 600.

Distribution of kulans in Badkhyz in the second half of the 1990s

In the middle of the 1990s the distribution of kulans in Badkhyz was stable and their natural habitats had enlarged. The largest part of the population did not migrate between winter and summer pastures. Animals used all available water sources. But since 1997 pressure on the wildlife, including the kulan population, increased heavily, and in 2000 the number of kulans was ten times less than in 1997. The Tedjen population and the Kerlek group were completely eradicated; animals' home ranges and their migration routes were interrupted. In other words, the population structure was broken up entirely. Animals did not mass in large herds any more; they were scattered widely over all areas of Badkhyz. Kulans left their usual habitats in summer and also their winter pastures. Small groups could be seen only, even during events of summer concentrations at water points.

Distribution of kulans in Badkhyz in the first half of the 2000s

Urgent measures for kulans conservation were taken in autumn 2000. Strict protection was provided around water points and winter pastures. The animals themselves soon restored their traditional migration routes. Kulans massed in the steppe-desert part of the reserve in winter, and in summer they came to the left bank of the Kushka-river. In the beginning of 2000, a few dozen animals lived in the reserve during summer. They used artificial springs mostly near Kyzyljar and Kepele. Due to some organizational problems in 2004 protection of animals was again weakened and Kulans came under poaching pressure again. In summer they dispersed widely along the left bank of Kushka-river (fig. 2). But in 2005 protection was restored, and kulans returned to their earlier range. A new water source was established in 2005 between two cordons - "Kepele" and "Khaudan". According to observations of reserve staff, more than 150 kulans massed there in summer 2005. Thus, summer groups of kulans moved 30 km to the east, and now their distribution corresponds to the distribution during the autumn-winter period.

Results of counts

The total number of kulans was estimated at 500 individuals in 1935; over 200 in 1942; between 300 and 400 in 1946-1948; 600 in 1957; 800 in 1969; 1,100 in 1973; 1,250 in 1976; between 3,500 and 4,000 in 1988 (GORELOV & SHAPOVALOV 1995) and circa 5,000 in 1993-1996 (LUKAREVSKIY 1999). Pressure on kulans population increased heavily in 1996, and numbers were reduced to 2,400 by 1998; with 2,008 animals registered on the Kushka bank (GORELOV & ISHANOV 1998). The isolated subpopulation on the Tedzhen River numbering at least 800 animals was wiped out. By the beginning of the 2000s, the total number of kulans did not exceed 500, and the entire population was fragmented to small herds of 3 to 10 animals, with up to 30-40 individuals seen only at watering places at any given time. In summer 2001, the Badkhyz population numbered about 580 individuals, with an extremely low share of foals: 3.9 % (fig.3).

The status of the Badkhyz population of kulan was discussed during a conference on nature conservation in Turkmenistan in 1998. Practical actions on the protection of this species were taken by the Turkmenian Government with financial and methodological assistance from WWF since 2000. Regular patrolling by four groups of inspector over the entire reserve area and the summer pastures along the Kushka-river started in 2001. Never before has the kulan population of Badkhyz been protected so strictly. Three artificial water points were rebuilt in the nature reserve for those kulans that did not leave the area in summer. The population began to grow by 20 % yearly and reached 900 individuals in 2003-2004.

In 2004, the number of animals dropped slightly but became stabilized in 2005 again. There were around 850-900 kulans in 2005.

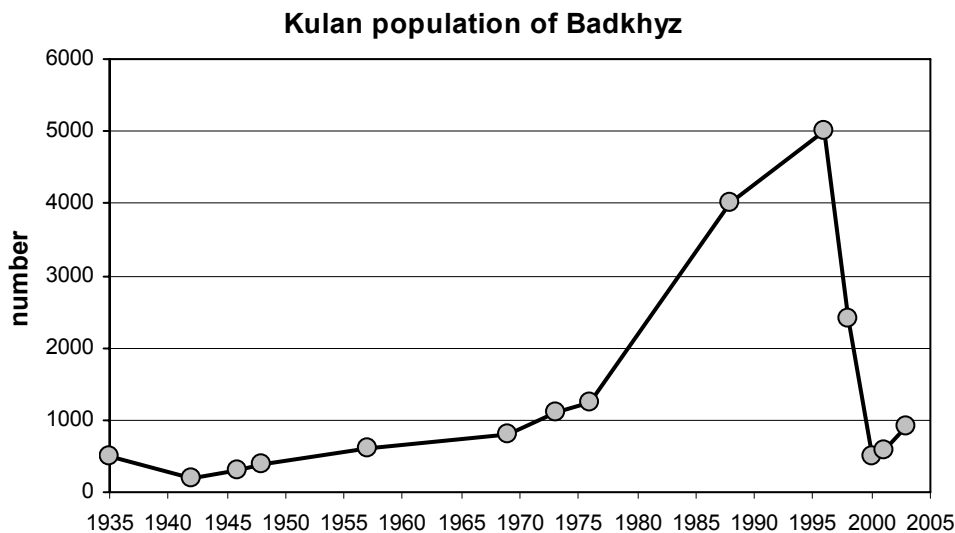


Figure 3: Dynamics of the kulan population of Badkhyz between 1935 and 2005.

Various reasons for fluctuations in kulans' numbers have been suggested in the literature. In particular, A.O.SOLOMATIN (1973) associates the low rate of population growth with various anthropogenic and especially climatic factors, which is unlikely to be true.

An analysis of all available data on population dynamics, social organization and behavioural ecology as well as on kulan's distribution and territoriality at different times leads to the following contrasting conclusions: The major reason of low numbers observed over 30 years (from the 1930s to the 1960s) was the heavy anthropogenic pressure (poaching), particularly in spring. For a successful reproduction cycle, there must be no disturbance at the breeding areas. Chasing kulans in spring causes mass deaths of newborn foals, negatively affects the breeding activity and often results in abortion as females get stressed. Having been disturbed at the watering places in summer, kulans left their grazing areas, which also caused a high mortality rate among foals especially at the age of 0.5 to 1.5 years. In earlier centuries, the reductions in kulan population numbers may have been caused by combined negative factors, both natural and human-induced. SOLOMATIN (1973) refers to cases when kulans were hunted almost to extinction during periods of adverse climatic conditions (e.g. severe draughts, so called "dzhuts", occurred in the northern part of kulan's range).

Conservation measures taken

From 2000 on, concerted actions were taken to prevent the decline of kulan populations in Badkhyz and other areas where kulans had been reintroduced. The system of practical protection over the Badkhyz Nature Reserve and adjacent areas was reorganized in 2001. The breeding areas were put under strict protection: no vehicles were permitted to enter these areas (these regulations have been in place for three years now). Regular patrolling by four inspector groups over the whole area of Badkhyz including the nature reserve was also introduced.

To ensure adequate protection of kulans at their watering sites a public inspection was established with the following objectives:

- to monitor the movements of kulans;
- to provide a presence effect;
- to take part in patrolling together with state inspectors;
- to prevent kulans from grazing in agricultural fields.

Three artificial water points were established in the nature reserve for those kulans that did not leave the area in the summer. Over 150 kulans used these water points. The Ministry of Environmental Protection of Turkmenistan put high fines on the illegal removal of kulans.

These measures have ensured the protection of kulan and have radically changed the attitude of local communities towards the problem of mammal conservation in Badkhyz.

The conservation measures allowed stabilizing the situation in the very first year of their implementation. The kulans formed groups of 150 to 250 animals each already in 2001, and the September 2003 count showed that the number of kulans in one herd increased to about 400. Young animals accounted for 17% of the population in 2002, and for 20 to 25 % in 2003. Preliminary estimates suggest that the Badkhyz area held approximately 900 kulans at the end of 2003.

Under favourable conditions, if the birth rate keeps around 20%, it might be expected that the kulan numbers will reach 2,000 in 2010 and 3,000 to 3,500 in 2015. This will comprise the carrying capacity of the whole Badkhyz area (the nature reserve alone can not support more than 2,000 to 2,500 kulans without degradation of natural ecosystem). With such an increase in numbers, the kulan population could probably get in conflict with agriculture in the surroundings of the nature reserve (encroachment into agricultural areas). To prevent the negative consequences of the rising population sizes, it is necessary to introduce a population management scheme as soon as the kulan numbers reach 2,000 to 2,500, including removal of part of the animals. The best use for the captured kulans is to introduce them to other areas within the historical range of the species.

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