UDC 595:591.9

A.B.Murzabaev, Sh.K.Yeleupaeva

The Karaganda State University named after E.A.Buketov

Bioecological characteristics Turgaj-Betpakdala populations *Saiga Tatarika, Saiga*

In article bioecological characteristics turgajsko-betpakdalinskoj populations Saiga tatarika are reflected. The purpose of the conducted research consisted in participation of restoration of populations of saigas and their protection as the saiga is one of key kinds of a steppe ecosystem. For today the decision of this problem consists in that inhabitants of the Central Kazakhstan participated in all undertakings on protection of saigas because Betpakdalinsky population of saigas lives, migrates, is impregnated, prepared for winter time in this region. In article it is told about the spent actions in region of dwelling of this of populations.

Key words: landscapes, mutual struggle, earth, steppe, organism, ecological system, saigas, condition, population, biosphere.

Topicality of theme Kazakhstan is a steppe country. Stipa steppe is peculiar to landscapes of Kazakh land. For many centuries steppe has been raising beauty and essence of Kazakh life and dictated traditions and customs.

To be in relation with steppe meant much for Kazakh people and it influenced on its mode of life. Our ancestors lived in aspiration for knowledge of boundless steppe, its inconceivable space, power. In this mutual struggle with himself and nature Kazakh person strengthens such qualities as resource, enterprise and strength of character, he acquires new features as power, persistence, understanding, sensitivity and sentimentality, aspiration for knowledge, respect for other people. We can notice considerable difference of people's characters born and brought up either in steppe or in the town. Nature teaches a person to see beauty and kindness, to think, to consolidate knowledge and skills at the same time nature promotes to form in a person such abilities as fortitude in difficult situations, survival in sharp frosts.

As soon as a person was born on the earth he began to interfere in nature problems. In particular for last 40–50 years a person has achieved grandiose successes in sphere of science and technology, and it allowed him to become full «owner» of a planet. We started to dig the earth in search of minerals, without thinking about consequences which we can bring to the nature. At present results of human work frighten — the earth is exhausted, requires help, ecological condition of the earth is in danger. The person should not interfere with the nature and ruin it, and, on the contrary, should be reasonable and live with it in harmony.

The basic landscape of Kazakhstan nature is steppe. It occupies 648 thousand km², that is one fourth of our territory. To protect steppe is a duty of every citizen of Kazakhstan, because steppe is a cradle of the Kazakh civilisation.

Suffice it to look at a map to see, that in the centre of Eurasia the wonderful country covering practically all natural zones which is called the Republic of Kazakhstan is located. On its open spaces we will meet both golden deserts and mountains, great sun-scorched steppes which stretch to Caspian sea in the west [1].

During the Soviet Union our people went through total husbandry which led to mournful consequences, but now our earth is in hands of strong people, and we hope for their right agrarian policy.

Every organism which is a part of ecological system is very important, as plays its role. So, ecosystem is an integrated organism. If one small particle of ecosystem breaks the work cycle disappears, all ecosystem will change balance or stop its existence. To keep all existing ecosystems on our planet is the purpose and debt of everyone. How many ecosystems have already disappeared since times of appearance of the first person and his transformation into the conscious person?

Among all ecosystems the closest and the warmest for the Kazakh people is ecosystem of steppe.

So, in order to keep steppe ecosystem, the most important problem for us is to restore population of saigas and to protect them because the saiga is one of key kinds of this ecosystem.

And today the decision of this problem consists in participation of the Central Kazakhstan people in all undertakings on protection of saigas because Betpakdalinskaya population of saigas lives, migrates, becomes impregnated, prepares for winter time in this region.

The purpose of work: Participation in restoration of population of saigas as one of key kinds of ecosystem in the territory of Kazakhstan steppes.

As a hypothesis of work I suggest the following thesis: if to restore population of saigas in the territory of Kazakhstan steppes it would promote to the restoration of fauna and flora, and also ecosystem of steppe.

According to the purpose, a subject, a work hypothesis research tasks are defined:

1. To study a condition of a saiga in the region chosen for research.
2. To lead open dialogues with residents, and also propaganda work.
3. To sum up research work.

The decision of tasks:

1. Studying of a research material according to the theme.
2. Planning, definition of directions of expedition:

A) To write article to the regional newspaper on a problem of saigas;

3. According to a route to define a condition of saigas population.
4. To make a discussion of saigas population with elders of auls and meetings with youth and pupils of high schools in the chosen points.
5. To carry out the analysis of the done work taking into account the information received from local residents.
6. To make the report on the done work and to publish results in the newspaper.

Chapter Steppe is a dwelling place. Steppe is a special, original geographical area of the earth with peculiar only to it immense open spaces, vegetation and original fauna. Kazakhstan from the north to the south consists of three flat natural-climatic zones — forest-steppe, steppe and desert [1]. The forest-steppe zone occupies a small part of territory, about 2 %. In itself the whole «country» the Sary-Arka (Kazakh small hill) is surprising. On boundless steppe spaces, at times in disorder, hills in 300–600 m in height and only places they interflow in manes reaching 800 meters in height are scattered. The Sary-Arka area includes such great mountains, as Chingiztau and Tarbagatai. The steppe zone is divided into three subzones on types of soils, by degrees of dryness of a climate and to prevailing types of vegetation. The subzone with ordinary and southern chernozem soils is fescue-stipa steppes with xerophytic forbs; the Subzone with light-chestnut soils is wermuth-stipa steppes [2].

Steppe ecosystem. The biosphere is a terrestrial cover where organisms of a planet live. In the certain environment, animals and microorganisms which constantly co-operate among themselves and environment this difficult mutual relation is called ecosystem, that is ecological system. To exist and continue to exist the ecological system, those plants which give an initial product must exist. In ecosystem plants absorb a solar energy and reproduce organic connections (at this time in atmosphere O_2 is allocated). And herbivores feed on these organic connections. Predatories feed on herbivores and get energy.

And corpses of animals decay under the influence of soil microorganisms and the earth absorbs them back. And so there is a circulation of substances and energy, and the life on the earth becomes stable. In any link of a feed circuit an organic waste is formed, their further disintegration is carried out by bacteria and microorganisms. The life in ecosystem is very difficult. Interaction of organisms and kinds in the environment happens differently. And feed circuits happen sometimes very difficult, multistage.

Steppe surprises a person with its many faces. Steppe, especially Kazakh steppe, is very beautiful. Walking on steppe each person can see fine landscapes; from different directions it is possible to hear, how the stream is running, how from the source the river is flowing, it is possible to see low mountains, and seeing all this beauty, you can not to take your eyes off it. What a fine smell of steppes! Plants which let out delicate aroma, a wormwood forcing once again to feel its smell. And this pleasure makes us run on steppe, run, run... (fig. 1).

We will try to look at young landscape not touched by a person, prehistoric steppe tenderly. It appeared in the tertiary period of the Cainozoic Era. Between forest and arid areas a new kind of a landscape started to develop. Instead of damp savanna of a neogene appeared forb vegetation in which obtected dicotyledons plants dominated. Steppe went through a glacial age several times, having released from ice cover occupied a position which has now [3].

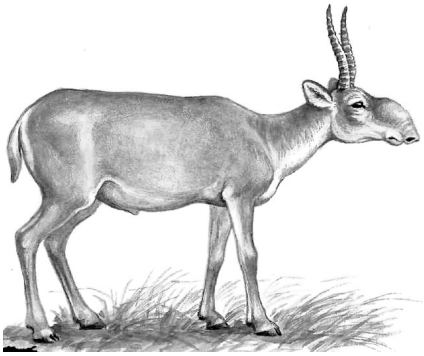

Figure 1. Buck of saiga

Steppe, what does it look like? If only look — it is beautiful, open space.

If only listen — it is an orchestra of contrasts. The wind which appeared owing to movement of air, a rustle of the leaves, the ringing locust, a singing lark.

If inhale its smells the most widespread aromas of steppe are a wormwood, sorrel, a strawberry …

Steppe is a wind, now dry and hot, now hot and damp — stuffy, now damp and cold — penetrating.

English Encyclopaedist Allan counted up, that in scientific literature there are at least 54 meanings of the term «steppe». And it also explains boundless beauty and open space of steppe.

Fauna in steppe ecosystem.

In steppe ecosystem there is a feature — it is in an open landscape. All mammals are adapted for it. Dwarfism of a herbage involves instability of ecological conditions in steppe. It is sharp sudden changes of illumination, heat, wind, humidity. The animal component steppe ecosystem differs the big propensity to phytophage. Even inveterate predators in steppes often refer to this wonder-working remedy in the conditions of common water shortage. So, beauty of steppe — plants not only are ornaments, but play the main role. Because plants are the main power supply of all living in steppe circles. With disappearance of a vegetative cover animals, including predators disappear also. If predatory animals in steppe disappear, number of rodents will increase, and old individuals can extend epidemics of various diseases.

When we speak about fauna at once we imagine large, evident wolves, foxes, hares. But the fauna is presented also by organisms of animals invisible by a human eye. It is the whole world of soil invertebrates, creeping, digging [3].

Pride of steppe — its mammal and large animals who decorate any landscape. Among mammals the basic link are hoofed animals. A landscape openness is the major factor to which steppe mammals are compelled to adapt. On more low resulted data it is possible to see, how steppe mammals are adapted to steppe ecosystems.

1. Adaptation to different weather, to strong winds, rain and drought that is important as contrast of a climate is the major property steppe ecosystem.

2. Ability to be rescued at sudden occurrence of enemies, more often birds of prey, a stone falling from the sky on extraction, wolves, etc.

3. Unsteadiness of visual and acoustical perception that is caused by constant movement of a steppe herbage.

4. Feature of a morphological and physiological structure of the animals connected with a life in holes.

5. Vigilance of sight allowing to notice everything on a long distance.

6. Colonialness is the major adaptive addition to features of orientation at hole inhabitant of steppe regions. Living in holes, for example marmots, always have the group that during a walking watch each other.

7. Masking colouring and behaviour.

8. Hibernation which gives a chance to save a considerable quantity of energy and promotes an exit from an unfavourable season.

9. Distant migrations are also characteristic steppe adaptation. Daily moving of herds of saigas and goitered gazelles on 150 km is usual thing!

10. Endurance and the big speed of run.

11. Gregarious instinct and a coordination of their behaviour.

12. Signaling and orientation at a gregarious way of life.

Saiga tartarica, Saiga

Saiga is a proud of Kazakh steppe, beauty. If on the Kazakh earth the most important sports event of a planet summer Olympic games were held there are no doubts that saiga would become its emblem.

The proud is that the saiga is contemporary of a mammoth. And since this period in a structure of its body there were no changes. Among pictures of animals drawn on stones by ancient people in the spacious Kazakh earth there is saiga with proboscidiform nose.

The proud is also that 30–40 years ago in 60–70s of 20 centuries number of saigas on our earth made nearby 1, 2 million and hunting on them was conducted. It is impossible to present steppe ecosystem without saigas. For a long time this animal of the Kazakh earth has lived in harmony with nature and with a person. Among works of our people, there is a kui «Wounded saiga», a song «Swift-footed saiga» and a poem «the Legend about sacred saiga».

Biological features. On external shape saiga reminds a large sheep. Eyes are big. Feet are thin. Head is held in a quiet condition horizontally and only at strong excitation rises above withers. Horns of lyrate forms, only bucks have. A tail and ears are short. In summertime colour of their wool is yellow-red. In summer wool is short, only 1–2 cm, in winter — 10 cm. Weight of large bucks reaches to 60 kg, average weight of bucks-40–50 of kg, a doe — 30–35 of kg, length of body 100–150 cm. Bucks live about 4–5 years, and doe does longer (8–9 years). Run, rocking and amble [4].

*The adaptation to an inhabitancy***.** When saigas go with all herd on special signals which move animals, they start to run jumping up to 1st metre under a bias on 45 degrees. Even lambs can so do it! It means «Be careful — danger!». And for lambs it is an unconditioned reflex. One more feature for animals steppe ecosystem — almost constantly either to catch up or escape. Nobody will manage to reach saiga in Kazakh steppe! It runs very quickly, with speed of 70–80 kilometres per hour. Possibility to show is connected such speed with feature of heart. From all artiodactyl, living in Kazakhstan, saiga has the biggest heart. For the speed of 80 km/h the herd with an amazing coordination carries out difficult maneuvers, for example instant turn on 90 degrees — and again accelerating momentum, to run in other direction. It is excellent quality, because it is possible to escape from the enemy.

Particular nose. A nose is long, proboscidiform, as an elephant has. In simple position especially at bucks the nose hangs down to a bottom. When saiga runs, his nose rocks from the party aside, as a pendulum. The internal structure of a nose is adapted for residing at steppes, there are no internal nasal bones, and this feature allocates it among other steppe animals. In a nose there are a lot of fibres — when the saiga hangs a head downwards, it helps to be cleared of the swallowed dust when it is cold, warms air in a nose and when becomes hot it cools. In the summer when becomes hot, small nasal capillaries, protect a body from overheat, as well as a trunk of an elephant. These features developed sense of smell well. Nostrils are lowered to a bottom. Saigas and a lamb find on a smell, and edible plants are defined by smell, and coming nearer enemy is also defined by smell.

Adaptations on a body. Though saiga has short ears hearing is very well. On rustling grass this animal defines coming enemy. A body hair is yellow-red, colours of steppe, in the winter it has white colour. This is an adaptation to conditions. The winter hair is in 70–80 % more thickly than summer one and in 3 times longer. And one more feature, hairs inside is hollow. Under fur having entangled and bound does not admit a cold wind. It shed hair 2 times: in spring and in autumn. Horns grow only at bucks, till 2. Horns as a weapon, are necessary for «gladiatorial» pichts with each other [4, 5].

Till the winter it collects fat in a body which thickness reaches 20–30mm. To be grazed on tebenevka is also the adaptation of animals, the saiga clears grass from snow with hoofs (Fig. 2).

Figure 2. Adapted for a life in steppe — a nose of saiga

Reproduction and animal yield. During reproduction the large buck heads herd, becoming the leader. It is proved and studied bucks of saiga to be capable to breed in 1,5 and does in 7 months. Impregnation begins in the middle of December. At this time hair of bucks starts to grow, outgrowths before eyes become more, the liquid with a pungent smell is discharged, filaments under eyes start to grow. Secretary activities of intermanual and inguinal glands amplify. During impregnation between bucks constantly collisions happen. The herd where gather about 30 does, is still headed by the skilled buck. The buck participates only in one impregnation. The 2nd impregnation meets extremely seldom. By materials of research during impregnation in winter bucks do not graze and do not eat, feed only snow. At this time, bucks, strongly exhausting, cannot adjoin herd and go alone. Many bucks perish.

The place of lambing is yellow steppe. To lamb the doe searches for a quiet place where nobody disturbs her. She chooses places, where grass is short and is warmed by spring solar rays. At the beginning of May does newborns appear. On the place of lambing hundreds and thousands of does gather in congestion. On this place nothing is heard because of noise of does and young kuralais. It is also a way of protection against enemies.

Colour of defenseless cubs not strongly differs from the earth, interflowing with it. At approach of danger they hide, close eyes and lay, having curled up, or having stretched out a neck on the ground. In this position they can lie some hours. It is peculiar to all steppe animals.

Basically the doe gives birth at night or early in the morning. Mother bears basically 1 or 2 cubs, barrenness is very rare. Especially it is typical of days of droughts, and at old individuals. An udder of a doe has 4 nipples, but front two nipples are poorly developed. 1–2 hours later after a birth the cub tries to leave this place, it is a self-preservation instinct as the smell of a waste of a uterus and blood attracts sensitive animals and birds.

Feeding. Saiga eats different plants. Because of necessity to stand constantly on its feet regardless of a season, it requires considerable quantity of energy, therefore it feeds on different grass. It feeds 81 kind of plants which concern 17 classes. Seasonally the number of used plants varies. In the spring basically plants are used with high humidity, such as ephemers and ephemeras. For this reason they seldom go to watering place. And lichens from Parmelia sort are also used which many animals do not eat.

They come to a watering place with packs in the hottest periods of summer. At this time they are very cautious. Often stop and look round. The pack basically is headed by a doe of saiga. If on a watering place it scents something wrong, despite strong heat and thirst, lead away the pack back. No saiga, «without permission» stays and touches water. All of them drink water in one place without looking at distance. They quickly drink (1–2 min), drink by turns. In deep places they can drink afloat.

Significance of saiga in ecosystem of steppe

Saigas are animals which keep herds of various size. The number of saiga in herd is different, in small herds from 1 to 10, 20, 50, in average from 51 to 100, 200, 500, and in large from 501 to 1000 and more.

Herds of saigas play very important role in the nature and ecosystem steppes:

1. If in steppes from time to time animals don't graze, the constancy of their vegetative structure will be broken. In this case saiga creates a condition to constancy and reproduction of plants.

2. Constantly changing a dwelling place saiga with its body helps to the distribution of plants. The seeds of plants sticking to its skin extend on long distances.

3. Thanks to hoofs of these animals seeds of steppe plants are trampled in soil.

4. The steppe soil dunged by excrement of herbivorous, receives back substances which have been carried away with forage.

5. As a result of grazing the superfluous leaf mass is removed by blows of hoofs constantly break a steppe laying which under the hypertrophied development prevents the renewal of plants sprouts.

6. When saigas change a dwelling place, the vegetation of their old pasture is again restored.

7. In steppe ecosystem saiga is also food for other animals. In winter time, weak and old individuals become food for predators. During mass impregnation predators feed on wastes, sometimes cubs are their victims.

8. Many insects and small organisms feed on a body of a dead saiga, and the rests of a corpse fertilize the earth [4, 5].

Migration. Migration is a mass change of a place of dwelling, during this period they move very long herds, long in some kilometres. The whole year and in period of migrations herd is led by a doe. Saigas migrate all their life. Constantly changing a pasture they protect against bad weather, rains and hunger. In autumn and winter they move on the south, and in spring and summer on the centre and the north. In a day they

cross at the average 10–20 km, and during cold time 40–45 km. Recently saigas meet many obstacles during migration.

These are consequences of intervention of the person in the nature: long railways, oil wells, the sowing areas, the dug up channels, the enterprises for the mining operations, the highways full of movement. It all influences on change of a direction of a route through which thousand packs have passed and which have not varied for centuries. It led to mass extinction of saigas. For example, oil well or channel crossing cause complex problems. Saigas have to change a route and to go not on steppes, and on the rocks, many of them die, not finding a way back, under hoofs of others. Pregnant does, cubs and old saigas often die. Some pregnant does bear not reaching to a place, cubs become a victim of predators. On our planet only the deer caribou of the North America passes ahead of saiga on distance and duration of migrations [6].

All proves, that saiga plays an important role in a biological metabolism of steppes ecosystem. Other animals are also benefits of steppe ecosystem. But the role of a saiga is special, because it migrates on a long distance.

Condition of population. At present time saigas apply to animals close to disappearing. In 1996 it was included into the list of disappearing animals of the International Union for Conservation of Nature and Natural Resources (IUCN). At the end of 20th century after disintegration of Soviet Union during the difficult economic period demand for meat and a horn of saiga has grown. Because of intensive hunting its number has strongly decreased. So, the number of saigas in 1970–80 was about 2 million, and in 2003 their quantity decreased by 21200 individuals. In 2005 the Government program on preservation and restoration of wild animals and saigas were accepted. The committee of forestry and hunting of the Agriculture Ministry of RK carries out this program. After acceptance of these measures the quantity of saigas increased. Under the report of 2009 in Kazakhstan live 81000 heads of saiga among them 45200 heads are population on Betbakdala. On calculation 2011 in Kazakhstan dwells beside 102 thousand goal saiga, of them 78 thousand form on Betbakdala population [7] (Fig. 3).

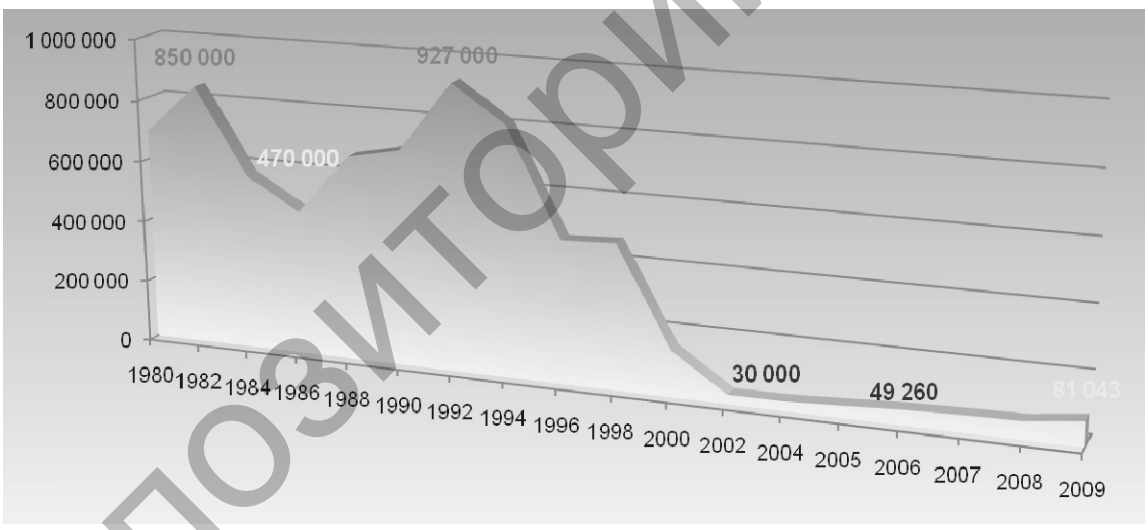

Figure 3. Accounting of life of saigas since 1980 till 2009

The shown quantity of saigas can be changed in consequence of strong hunger and unfavourable weather if it lasts several years. Poaching is one more danger. Today poachers prevent from restoration of saigas. Off-road vehicles, ledges, use of the various weapons promote destruction of saigas, and create big problems for wildlife nature conservation [6].

Rise in awareness of local population

By our defined route our way directed from Karaganda city to Zhezkazgan. Since spring till late autumn saigas live in places making population of Betbakdala.

We visited following places: Atasu, Karazhal, Aktau, Zhambyl mine, Shalgiya, Zhairem, Togysken, Kyzylzhar, Tuiyemoinak, Koskudyk, Zhylandy, Borsynger, Terekty, Karsakbai, Ulytau, Sarlyk.

Last decades in the named districts saigas are seldom found. Local population, especially youth, including schoolchildren did not see a live saiga at all, they know only from stories of seniors and on photos.

In conversations with aksakals of auls there was information that they know about saigas a little and only that people told: «ten saigas passed there», «in neighboring aul they saw so much» etc.

Thus, herds of saigas which counted one million individuals in 70–90s of 20th century, became for today a rarity, therefore some inhabitants do not remember them at all. It proves once again criticality of circumstance.

The conversations made with schoolchildren, handed out booklets explaining value and a role of saiga in the nature, were apprehended by pupils with special interest. Children were interested, began to tell that they know about saiga from seniors, in what houses hunters — poacher lived etc. Films, cartoons were shown at all meetings.

Result of our work was meetings and conversations with local population, aksakals, schoolchildren on which we propagandized the work on the restoration of saiga population and explained value of this kind of mammals for ecology of the region.

Summaries

Conclusions we came as a result of research:

a) If population of saigas is restored in the territory of Kazakhstan steppes it would promote restoration of fauna and flora, and also steppes ecosystem;

b) The important place of saiga in ecosystem of Kazakhstan steppe is defined;

c) Population of saiga in the Central Kazakhstan is in catastrophic position;

d) Research materials are published in mass-media.

Proposals

1. Offer the committee of forestry and hunting of the Agriculture Ministry of RK to record a saiga in Red Book of Kazakhstan.

2. For improvement of ecological position of a saiga in region it is necessary qualitative and operative information on a condition of populations, on movements, places of wintering and lambing of saiga populations.

3. Strengthen the struggle against ceaseless poaching.

4. Accept the program of economic development of agricultural population of region for the purpose of prevention of illegal hunting for a saiga.

References

1 *Bekenov A., Eszhanov B., Mahmutov S.* Mammals of Kazakhstan. — Almaty: Gylym, 1995. — 280 p.

2 *Kovshar A.F., Kovshar V.A.* Fauna of Kazakhstan. — Almaty: Open Society «Almatykitap», 2003. — 128 p.

3 *ShCherbakov B.V.* My planet — Kazakhstan. — Almaty: Zhazushy, 2008. — 208 p.

4 *Fadeev V.A., Sludsky A.A.* A saiga in Kazakhstan. — Alma-Ata: The Science, 1982. — 160 p.

5 *Bychkov E.A.* Live treasures of Kazakhstan. — Alma-Ata: Kazakhstan, 1979. — 216 p.

6 *Shajmuhanbetov O.* Preservation of saiga in the Central Kazakhstan: public organizations, the state and local population // The Steppe bulletin. — Novosibirsk, 2004. — № 15. — P. 28–31.

7 Aviaaccounts of saiga by the Kazakhstan association of preservation of a biodiversity // ASBK news. — May–August. 2011.

А.Б.Мырзабаев, Ш.К.Елеупаева

Торғай-бетпақдалалық *Saiga Tatarika, Saiga* популяциясының биоэкологиялық сипаттамасы

Мақалада далалық экожүйенің ең басты түрі болып табылатын торғай-бетпақдалалық *Saiga Tatarika* популяциясының биоэкологиялық сипаттамасы берілген. Сонымен қатар авторлар қазақ даласының мақтанышы аталған бетпақдалалық киіктерді Қазақстан территориясының далалық экожүйесінде сақтап қалу және аялау үшін Орталық Қазақстан тұрғындарын осы сирек популяцияны сақтау шараларына белсенді атсалысуға шақырады. Аймақтағы киіктер популяциясын қорғауға қатысты атқарылған басқа да қорғау шаралары келтірілген.

В статье приведены биоэкологические характеристики тургайско-бетпакдалинской популяции Saiga tatarika, являющейся одним из ключевых видов степной экосистемы. Авторы приходят к выводу, что для восстановления популяций сайгаков и их охраны необходимо, чтобы жители Центрального Казахстана участвовали во всех начинаниях по защите этого редкого вида животных. В статье также освещены охранные мероприятия, которые осуществляются в регионе, где Бетпакдалинская популяция сайгаков обитает, мигрирует, оплодотворяется, подготавливается к зимнему сезону.