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BUREAU OF THE COMMITTEE
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IN THE FIELD OF BIOLOGICAL AND LANDSCAPE DIVERSITY

BU-DBP

Group of specialists - European Diploma

State Tsentralno-Chernozemny Biosphere Reserve

(Russian Federation)

APPLICATION

Ministry of Environmental and Natural Resources
of the Russian Federation

EUROPEAN DIPLOMA APPLICATION

Country Russian Federation

Name of the Area State Tsentralno-Chernozemny Biosphere Reserve

Body responsible for its management
Ministry of Environment and Natural Resources of the Russian Federation

INTRODUCTION

The State Tsentralno-Chernozemny Biosphere Resrve is under the authority of the Department of Wildlife Conservation of the Russian Federation Ministry of Environment and Natural Resources. The Reserve is one of Russia's oldest nature reserves. This biosphere reserve was set up in 1935 following the proposal and personal effort of Professor V.V. Alekhin from Moscow University. Within six decades the Tsentralno-Chernozemny Biosphere Resrve has become the leading institution in Russian steppe science and important center of research and protection of the steppe biota. The Reserve has published 14 volumes of transactions , conducted over 10 scientific conferences, took part in two international projects on space-watch environmental monitoring (NASA,USA) and was represented at the First International Soil Congress. But the most valuable achievement of the Reserve is preservation, for the benefit of living and coming generations, of the unique virgin grassland steppe on chernozems in combination with leafy groves over the area of 5311 ha in the most densely populated and industrialized region of European Russia - Central Chernozems **(maps 1.1 - 1.2).**

This is a biosphere reserve designated under the program "Man and Biosphere".

GENERAL DESCRIPTION

The history of steppes (like that of North American prairies) was rich in dramatic events. This was the first case of nearly total destruction of an entire geographical zone. Steppe ecosystems were and remain of crucial importance for human civilization in solving most essential problems. Of the most important is the problem of food resources which is directly linked to agricultural production.

The sphere of the Reserve's activities includes the Kursk and Belgorod Districts in which 82-86% of the territory is occupied by arable lands, 7% - by woodlands and the remaining area is used for the road network, large thermal and atomic power stations, gigantic open pits providing about 40% of all iron ores mined in Russia, plants producing all kinds of building materials, numerous industries such as chemical, food, tanning, light and machine-building, and finally large animal-breeding and plant-growing farms.

Under such conditions the development and expansion of the Reserve territory, restriction of intensive farming practices in the buffer (protective) zone of the Reserve where major land users are private farmers and joint-stock companies, organization of tourism (including facilities for urban population going on their week-ends) are exceptionally difficult tasks.

Table 1.

Area of the State Tsentralno-Chernozemny Biosphere Reserve

Units of the Reseve	Create	Area (hectars)	
		Reserve's Core	Buffer Zone
1. Streletsky	1935	2046	2440
2. Kazatsky	1935	1638	2079
3. Jamskoy	1935	566	1400
4. Barkalovka	1969	365	1746
5. Bukreevy Barmy	1969	259	1418
6. Lysye Gory	1993	170	860
7. Stenki- Izgorya	1995	267	337
In all:		5311	10280
8. Zorynsky Bolota (is creating)	?	856	-
In all:		6167	10280

Relif and soils

The Reserve is located within limits of the Middel-Russian upland and the Voronezsky shield, which serves the base for sedimentary rocks. A dark-gray sand, clay marl and clay lie on them. The relif is strongly divided by large ravines with numerous branchings and is complicated by various forms of microrelif. Despite of high dissection of relif, the Reserve territory is very poor by water sources.

The Jamskoy, Lysye Gory and Stenki-Izchorya units are located on watershed of the rivers Oskol and Northern Donets; Barkalovka and Bukreevy Barmy - on watershed of the rivers Oskol and Kshen. All of them belong to the Don rever system. The Streletsky and Kazatsky units belong to Dnepr rever system and they are located on watershed of the rivers Seim an Psel.

The Reserve is well known for its soil, which is called "chernozem" (black and fertile soil). Depending on relif different kinds of black soils occur in the Reserve area: typic chernozem is the most widespread and occupies about 55% of the area; leached

chernozem - 20-25% ; podzolized chernozem - not more than 10% of the area. The specific feature of the soil cover of the Reserve is that the chernozem occurs not only under grass vegetation but under forest as well. Chernozem are prevailling types of soil in the Reserve, however medow-chernozem and grey forest soils are marked in some places. The thickness of humus horizon diverses from 0,8 to 1 m. Humus contents vary from 9 to 11 %.

Climate

The Reserve is located in a zone of a moderate - cold climate, yearly mean temperature + 5.3 °C . The coldest months are January and February, their average temperature are -9.1, -8.6 °C (respectively), the warmest - June и July (respectively 17.4, 18.0 °C). The maximum temperature during the last 45 years of observation at the Reserve meteorologic station was marked in July 1947 and August 1972: +35.6 °C, the minimum - in February 1956: -35.4 °C.

The cold season (daily average temperature below 0) begins usually in November and lasts about 135 days. The weather in winter is cloudy, often with strong winds and weak frosts. The average winter-grade temperature: -6.4 °C. Sometimes there are years, when snow cover is destroyed completely or partially in middle of a winter. The thaw are usual, but frequency them vary from year to year. Snow descends more fast, than is accumulated. Final snow melting is usually observed in April. The warm season (daily average temperature above 0) begins usually in 18 March and lasts about 230 days.

The Reserve is characterized by moderate humidification. The annual sum of precipitations (580 mm) exceeds the annual evaporation (408 mm). In some years precipitations can considerably deviate from the norm. For example , in 1951 it was 768 mm (135 % of the norm) but in 1953 - only 404 mm (70 % of the norm). The precipitations in more than half cases are rainfall and that occurs mainly in the warm period of the year: about 70 % of it is registered from April till October.

Climatic conditions of the Reserve together with fertile and thick soils are favorable for the growth and development either grass or forest vegetation.

Why save this steppe area , the last one in Europe ?

The fate of the steppe (like the prairie of the Great Plains of America) is a dramatic one. This is the first case of a natural zone that has been virtually wiped out in its entirety. At the expense of steppe ecosystems, human society has resolved and continues to resolve its most essential problems, most important of which is obtaining food resources. About ten

thousand years ago the human population of ten million people, mostly hunter-gatherers (fruits, berries, roots, game, fish, etc.) came up against the unpleasant fact: the abundance of shelf products in the unfailing "biosphere supermarket" became insufficient to cover the total annual demand by people. Having understood that the biosphere is not a bottomless barrel, ancient peoples had to invent agricultural systems, using grasslands (i.e., steppes) as a model. Wild steppe ecosystems had the most thick and fertile soils on the planet. This wonderful "vegetable garden" provided nutrients for the "pet" project of humans agriculture. Thanks to the steppe, man avoided starvation and overcame the first crisis in cohabitation of society and the biosphere. Operation "steppe agriculture", put to an end in the 1960s, allowed humans to increase their representation on the planet to four billion.

Today almost all the virgin steppes (and their analogs in the New World, prairies) have been converted to intensive agriculture. In Russia, for instance, we can find only a few fragments of undisturbed steppe, still surviving in isolated patches in individual Zapovedniki throughout this zone. Steppe remnants are usually located where the landscape geology made farming "inconvenient" for human settlements. Today scientists at Tsentralno-Chernozemny Reserve try to find answers to the following important questions, using the steppes in Reserve as a baseline study area: What kind of consequence will destruction of steppes have for conservation of diverse steppe landscapes and for genetic diversity? Do we have sufficient genetic resources to restore the steppe? Can we limit ourselves to restoration or conservation of fragments of steppe like rare museum pieces or should we strive to conserve entire landscapes and ecosystems? These complex questions should be the subject of an international dialogue among conservationists and scientists from Russian, the USA, Ukraine, Canada, Mongolia, Kazakhstan, and others.

Endangered ecosystems: medow steppe

The opend spaces of the Reserve are occupied by the herbaceous types of vegetation (steppe and medow associations), that makes about a half of all territory.

Main riches of the Reserve is virgin zonel steppe type of vegetation, which was formed here under the influence of natural conditions of forest-steppe landscape. Our steppes are of the northern variant and are called medow steppes. They differ essentially from the steppes of souther Russia. Plants here vegetate during whole summer, they have only a winter period of rest.

The northern steppes are characterized by high diversity of flora and as a result large variety of colours. The meadow steppes still surviving in the preserve are among the most diverse temperate plant communities in the world. Of all the plant communities existing in the former Soviet Union, meadow steppes of Tsentralno-Chernozemny Reserve have the

highest species richness (number of plant species per square meter). On a single square meter of the steppe here up to 80 (!) species of higher plants can be found. For comparison, not more than 30 to 40 species are found on one square meter of a diverse meadow in temperate zone either in Russia, or in North America. It means that steppe communities here reached the highest differentiation of ecological niches ever described. Although overall diversity of plant species in Brazilian rain forests is undoubtedly greater, there species are not so tightly "packed together" as here.

At such density of grass it is possible to allocate about 7 vertical layers, the highest layer reaches 100-120 (sometimes to 150) sm. Transitions between layers are smooth and gradual.

The coverage of medow steppe plant communites is very high as as well - about 100%. Limits of fluctuations of phytomass above the ground are very wide. For the period 1956-1994 the total phytomass above the ground of medow steppe varies from 2,1 to 13,5 ton per hectare.

Steppe flora: unique phenomenon

The flora of the State Tsentralno-Chernozemny Reserve is rich and exceptionally interesting: 1150 species of vascular plants are now known from the territory of all units of the Reserve, that is 48% of plant diversity of the Tsentralno-Chernozemny Region, which includes 6 districts.

For nature protection the most valuable are the species of steppe flora-cenotic complex, many of them are not registered anywhere else in the reserves of Russia : the white-stem milk vetch (*Astragalus albicaulis), Crambe tataria, Diplotaxis cretaceus,* the chalky rocketweed *(Erucastrum cretaceum), Helianthemum canum, H. cretaceum , the* June grass *(Koeleria talievii),* the hirsute flax *(Linum hirsutum), L. ucranicum, Pimpinella titanophila, Silene supina.*

15 species of plants of the Reserve are from the Red Book of Russia. They are the many-coloured bulbocodium *(Bulbocodium versicolor), Hedysarum grandiflorum, Iris pumila,* the Russian fritillary *(Fritillaria ruthenica),* the yellow lady's slipper (*Cipripedium calceolus),* the dark-winged orchis (*Orchis ustulata),* the thin-leaved peony (*Paeonia tenuifolia),* 3 species of the feather-grass (*Stipa dasyphylla, S. pennata, S. pulcherrima),* the rock jasmine (*Androsace koso-poljanskii*), the alaunian cotoneaster (*Cotoneaster alaunicus),* 2 species the rose daphne (*Daphne altaica , D. cneorum)* and *Pinus sylvestris var. cretacea,* etc.

Favorable climatic conditions and rich diversity of vascular plants have promoted development of many species of mycobiota. Stationary mycological researches are carried

out since 1976 in the Reserve. By the present time the list of mycobiota consists of 165 species of macrofungi and 607 species of microfungi. About 2,5 thousand of herbarium samples are stored in the collection of the Reserve. 2 species of macrofungi are listed in the Red Book Russia: *Grifola umbellata* and *Clavariadelphus pistillaris.* Besides plants there are 110 species of moss and 40 species of liches.

Flora of the Reserve (taking account of the "Zorynsky Bolota" - a new unit, which is now being organised) is high representative for the region, and it is under the effective control and strict protection.

Pictures (aspects) of steppe

The steppe plant carpit is rich and everchanging. From early spring to the middle of summer 5-8 coloured aspects (sometimes even 11-14) change one another. In the middle of April the steppe is covered with violet patches of rock lily (*Pulsatilla patens*) surrounded by a gold-yellow sea of cowslip primrose (*Primula veris*) and spring adonis (*Adonis vernalis*) flowers. At the begining of summer the blue flowers of medow sage (*Salvia pratensis*) and dropping wild sage (*S. nutans*) make an impressive appearance. The steppe looks like a sea with silver waves when feather-grass is in blossom. Such plants as the meadow brome (*Bromopsis riparia*) and *Arrhenaterum elatius* are always abundant here during last years and among them there are white heads of the drowort (*Filipendula vulgaris*). At the beginning of July *Onobrychis arenaria* and *Galium verum* make a variegated picture of the steppe. July is a month of ripenning seeds of the greater part of steppe plants. Then haymaking begins, which is one of the most important measures in the Reserve, that helps us support our steppes in thier original state.

Forests: natural succession without end

There have never been large forests in this area, but small islands of forests separated by clearings and pasture, consisting predominantly of English oak (*Quercus robur*) and with poor undergrowth.

The Reserve forests are represented by broad-leaved forests which are typical for the forest-steppe zone within Russian Plain. The forests,as a rull, are surrouded by filds, natural and artificial grass communites. About 71% of the forest-covering area of the Resrve is occupied by the oak- forests, 20% - artificial forests (Lysye Gory and Stenki-Izchorya units). Depending on relif the oak-forests are divided into 3 groups: small forests in steppe ravines, watershed forests and highland forests. The average age of the forests is

that 55-75 years old. They have middle productivity (II-III class) and plenitude from 0.7 to 1.3. The steppe ravines are occupied by high plenitude forests, the plain areas - by rarefied one.

The first forest stratum is formed by English oak (*Quercus robur*), sometimes - the aspen (*Populus tremula*), the small-leaved linden (*Tilia cordata)*, Norwegian maple (*Acer platanoides*). Second forest stratum is weak. Alongside with a impurity indicated trees in its addition participate: the *Pyrus communis, Malus sylvestris, Salix caprea, Ulmus glabra.* Characteristic feature of the modern space structure of forests - well generated undergrowth, consisting of broad-leaved trees (*Acer, Ulmus*) , wild berry-producing trees such as (*Pyrus, Malus*) and also numerous bushes (*Padus, Euonymus, Corylus* and other).

At the present time natural reforestation is taking place with many different broad-leaved trees, among them the small-leaved linden (*Tilia cordata)*, Norwegian maple (*Acer platanoides*), common maple (*A. campestre*), European ash (*Fraxinus excelsior*), mountain elm (*Ulmus scabra*), bird cherry (*Padus avium*) and European hazel (*Corylus avellana*).

Fauna in need of protection

Among the land vertebrates on the Reserve territory, there are 44 species of mammalia. More than a half of them are tipical for the broad-leaved woods, about a quarter - for steppe zone.

The vertebrate fauna of the Reserve is enough representative for whole Central-Chernozemny Region (including 6 Districts), but because of a small sizes of a protected territory less than a half of all species are common here. The vertebrate fauna has features distinguishing it from other nature protected areas of Russia. Only the Tsentralno-Chernozemny Reserve has rather large local population of mole rat (*Spalax microphtalmus*). This form is listed in the Red Book of Europe. Also only here to be found are the nothern birch mouse (*Sicista Strandi*) and the southern birch mouse (*Sicista severtzovi*) .

The most common animals in the Reserve woods are the elk (*Alces alces*), the wild boar (*Sus scrofa*), the roe deer (*Capreolus capreolus*), the fox (*Vulpes vulpes*), the beadger (*Meles meles*), the marten (*Martes martes*), the bank vole (*Clethrionomys glareolus*), the yellow-necked mouse (*Apodemus flavicollis*), the field mouse (*Apodemus sylvaticus*) and the striped field mouse (*Apodemus agrarius*), the East European hedgehog (*Erinaceus concolor*). During last years the red squirrel (*Sciurus vulgaris*) has penetrated in Reserve units. The red deer (*Elaphus europaeus*) occurs only in the Stenki-Izchorya unit.

It is also worth mentioning, that the wolf (*Canis lupus*) constantly breeds in the Kazatsky unit.

The medow steppe is place where we may distinguish first of all a group of fauna which do not constitute now a serious theat. This group includes the here (*Lepus europaeus*), the common vole (*Microtus arvalis+rossiameridionalis*), the English shrew (*Sorex araneus)* and the leser shrew (*Sorex minutus*), the steppe lemming (*Lagurus lagurus*), the spotted soslik (*Citellus suslicus*) and the common hamster (*Cricetus cricetus*).

In the second group we can include rare species: the European polecat (*Mustela putorius*) and the Russian wild polecat (*Mustela eversmanni*) which is truly wild, not only its behaviour but also in its appearance, the bobak (*Marmota bobak*) which formed a small colony nearby the border of the Jmsky unit, the racoon dog (*Nyctereutes procyonoides*). There are some rodents, but these are of minor importance: the havest mouse (*Micromys minutus*), the scilly shrew (*Crocidura suaveolens*), the common mole (*Talpa europaea*), grey hamster (*Cricetullus migratorius*), the grounde vole (*Arvicola terrestris*) and the grate jerboa (*Allactaga major*).

A cold-blooded animals: amphibia and reptile

The amphibia fauna of the Reserve includes 8 species . Only one of them, the green toad (*Bufo bufo*), is very abundant. The most favorable conditions for this group can be found in the Stenki-Izchorya unit, which was created in 1995, and the Zorynsky Bolota unit, which will be created next year after finishing negotiations with land tenats. The wetlands of these units are of great value not only for amphibia but for birds too. Among 5 species of the reptile the heaviest interest presents the orsinis viper (*Vipera ursini*). Small population of this endengered species in the Reserve is located on the limit northern range. There are no find of the orsinis viper over the Reserve limits.

In the steppe habitats the sand lizard (*Lacerta agilis*) is numerous, in the wetland - the grass snake (*Natrix natrix*). Other species: the viviparous lizard (*Lacerta vivipara*) and the slow worm (*Angius fragilis*) occurs rather rare.

Birds

The bird fauna of the Reserve is no different from that in the Tsentralno-Chernozemny Region. For example, the list of the bird species found in the Region consists - 307 species, the Kursk District - 264, the Belgorod District - 279, the Reserve - 210 that makes up 68% of the total list in spite of the small protected area.

In the Reserve there are many migratory and sedentary species of birds including: the honey buzzard (*Pernis apivorus*), goshawk (*Accipiter gentilis*), kestrel (*Falco tinnunculus*), partridge (*Perdix perdix*), turtle dove (*Streptopelia turtur*), hoopoe (*Upupa epops*), great spotted woodpecker (*Dendrocopus major*), etc. The most common birds of prey are the black kite (*Milvus migrans*), which dicrease in the number of last 10 years of all sites, and the buzzard. The last one is sometimes confused with the golden eagle, but is much smaller and ligter in color.

The The bird-life in the Reserve is rich in endangered species. For example, the steppe eagle (*Aquila nipalensis*) and the short-toed eagle (*Circaetus gallicus*), breed every year in the Reserve. Near-by of wetland live the black stork (*Ciconia nigra*) and the osprey (*Pandion haliaetus*). From 23 bird species are listed in the Red Book of Russia on the Reserve territory 9 of them are recorded. But some species cannot be found now although the long-legged buzzard (*Buteo rufinus*), the great bustard (*Otis tarda*) and the little bustard (*Otis tetrax*) were breeded here before the Second War.

Bats: secrets of night

Birds are, in any case, not the only winged vertebrates to be found: according to the Reserve study, bats are not completly absent. Species rare mentioned in the Russian Plain, including the serotine bat (*Eptesicus serotinus*), the noctule (*Nyctalus noctuls*) and Nathusius pipistrelle (*Pipistrellus nathusii*) .

Invertebrates: unexplored world

The entomological fauna can be regarded as of greater scientific interest than the vertebrates, even in the absence of an exhaustive study. Fauna of insects numbers about 4000 species. There are 1243 species of beetles, 890 species of butterflies, 315 species of *Hymenoptera*, 282 species of bugs, 450 species of *Diptera*, 84 species of *Orthoptera*, 37 species of *Homoptera* and 20 species of dragon-flies. 25 species of insects, dwelling on

the territory of the State Tsentralno- Chernozemny Reserve are put down in Red Books of Russia.

The most rare of these insects: *Saga pedo* - large windless grasshopper, almost disappeared on other territories, *Carabus hungaricus* - large beatiful predatory beetle, which is disappearing under anthropogenic influence, *Acherontia atropos* - one of the rarest butterflies of our country.

Rarity of majority of insects is conditioned not so much by direct extermination but by reduction of places, suitable for feeding and breeding. That is why the State Tsentralno-Chernosemny Reserve is original island of rescuing for many species of insects. Such rare species as *Lucanus cervus, Papilio machaon, Papilio podalirius, Apatura iris* are rather usual in the reserve.

In steppe and schrubs you may meet an interesting predatory insect - *Mantis religiosa*. This species reduces its quantity - and in the Reserve too. The cause, perhaps, is in the dust pollution of the plant surface because of neighbourhood of concentrating mill.

There are 113 species of spiders and 122 species of oribatide mites in our reserve. The latter is a major group of soil saprofages, vital activity of which determines the soil fertility.

The Reserve has rich collectional fund, that numbers about 3000 specimen and permanently increases.

Staff

The total number of employees : 62. Departmental Management consists of 8 employees. **The Scientific department** of the Reserve includes of **17 experts,** performing scientific work (florist, geobotanist, forester, biogeography, phenology, and soil researcheres, ornithologist, zoologist, entomologist, microbiologist and other). There is auxiliary staff laboratory assistants and senior laboratory assistants.

The Supplies and Services department includes of **24 workers** : engineering - mechanic, gas operator, forwarding agent, groom, inspectors, cleaner, electrician, sanitary technician, drivers and others.

The Ranger Services consists from **13 rangers.** The employees of the Reserve carry out expert valuations in the main questions of functioning protected natural territories of Kursk and Belgorod region and conservation of the biodiversity.

Constant activity of the Reserve is maintenance of a optimum mode protected ecosystem. Employees of the Reserve regularly observes a total situation on the Reserve's territory and its a buffer zone. For maintenance of a biocenotic variety of a medow steppe a different regim of protection are allocated: constantly unmow hay, annually mow hay, four year haymaking and one year rest, pasture.

FINANCE

Each Year the Government in consultation with the authority of the Department of Wildlife Conservation of the Russian Federation Ministry of Environment and Natural Resources sets the Central-Chernozem Biosphere Reserve's net expenditure limits. For the year 1995 the total levy and contributions to the expenditure of the Reserve's are as follows:

Income

	%	$			Rbl (million)		
		planing	was given	in fact	planing	was given	in fact
Federal budget	41.5%	42 060	36 600	38 855	210.3	183.0	194.3
Federal ecological Fund	7.5%	7 000	7 000	7 000	35.0	35.0	35.0
Central Forest Reserve	0.03%	30	30	30	0.15	0.15	0.15
Gubkin ecological Fund (Belgorod Region)	1.5%	1 400	1 400	1 400	7.0	7.0	7.0
Belgorod ecological Fund	4.2%	10 000	3 895	3 895	50.0	19.5	19.5
Stock Joint Iron-stone Company "Lebedinsky GOK"	7.9%	7 400	7 400	7 400	37.0	37.0	37.0
Kursk ecological Fund	7.1%	6 652	6 652	6 652	33.3	33.3	33.3
Administration Medvensky District	0.47%	420	420	420	2.1	2.1	2.1
Administration Kursk Region	2.8%	2 600	2 600	2 600	13.0	13.0	13.0
Other	27%	25 271	25 271	25 271	126.4	126.4	126.4
At all :	100%			93 523			467.8

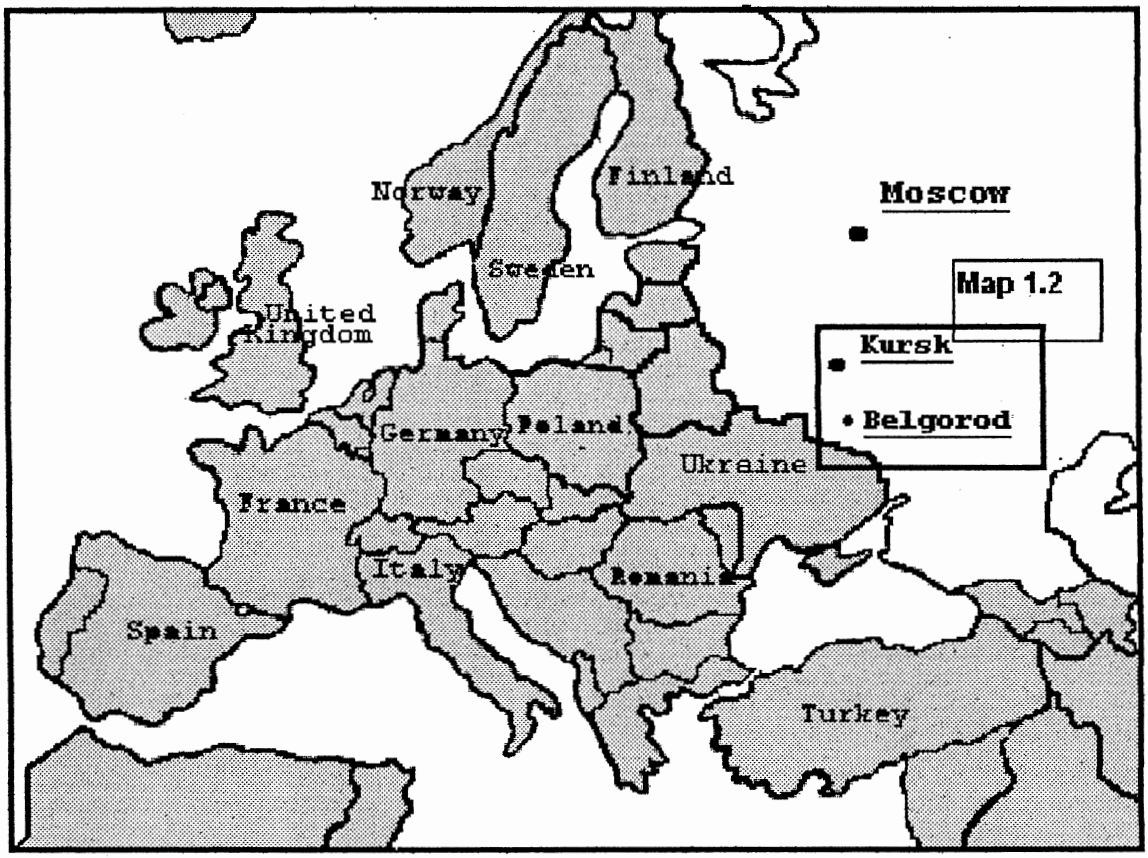
Expenditure

Staff Costs		21 583	108.9
Tax		8 617	42.1
Conservation		13 013	65.1
Science		3 485	17.4
Ecological Education		2 058	10.3
Investments		14 157	70.9
Vehicles		10 412	52.1
Support to local community		19 020	95.1
Recreation		1 178	5.9
At all :	100%	93 523	467.8

Nikolai Maleshin is the Director of Tsentralno-Chernozemny Biosphere Reserve

Map 1.1

Location of the State Tsentralno-Chernozemny Biosphere Reserve



Map 1.2

The units of the State Tsentralno-Chernozemny Biosphere Reserve

Frontier:

—.—.— State

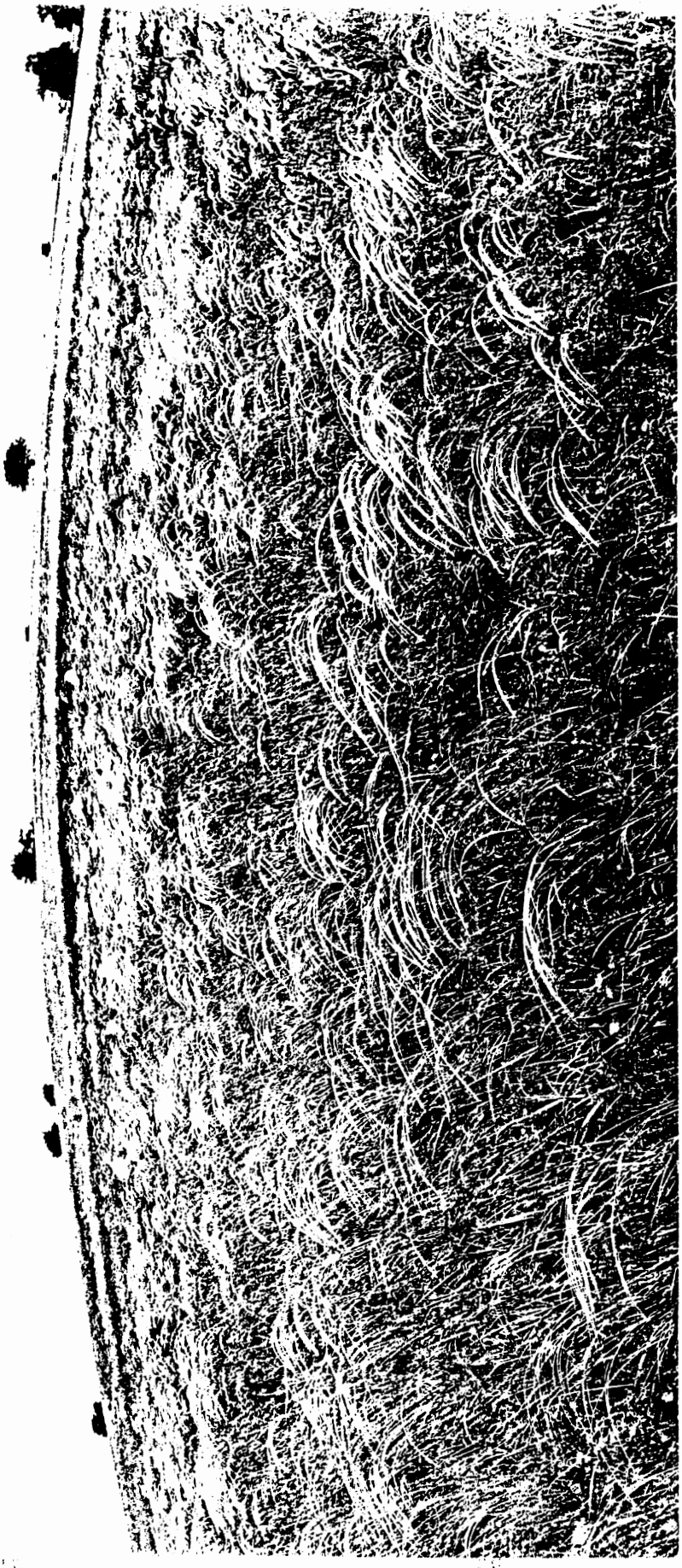
—.—.—.— Region

- - - - - - - - Reserve

Reserve's Units:

1. Streletsky
2. Kazatsky
3. Yamskoy
4. Barkalovka
5. Bukreevy Barmy
6. Lysye Cory
7. Stenki-Izgorya
8. Zorynsky Bolota

The Reserve's Units are created: - 1935 - 1969 -1993-95 - 1996



The situation at each Reserve section is briefly characterized below.

STRELETSKY (Kursk District, Kursk Region) was organized in 1935-1940 with the total area of 1460 ha. In 1937 it was enlarged to include the following forest morphologic landscapes (ml): Dubroshina, Dedov Vesely and Solovyatnik. The total area reached 2048 ha (Zozulin, 1949). In perspective, this area may be enlarged by 157 ha to include the arable land wedged between Dubroshina and Dedov Vesely. However, negotiations of many years' standing with the Chernyakhovsky joint-stock company, whose lands are in the 3-km wide protective zone surrounding the Reserve, resulted solely in the agreement to stop application of any herbicides, mineral fertilizers and use of aircraft for such treatments of fields.

The above restrictions created in the protected zone favourable conditions for a dramatic growth of the populations of partridge, European hare, fox and wild boar. Increased populations of the first three species had no effect on farming practices. But the wild boar is a nuisance to farmers because besides direct losses of potato, maize and oats crops, it attracts into fields automobile poacher hunters. As the result, up to 20% of the crop is lost under the wheels of their jeeps and trucks, whereas Russian legislation does not stipulate any monetary compensation for the damage to field crops inflicted by the wild boar itself and its illegal hunting.

An optimal solution of the problem may be partial purchase of this land or its strict Reserve-sponsored guarding. The Reserve's 1992 proposal to buy this land at a price of 15 mln roub./ha was declined. The improved protection of the buffer zone from poachers will require 24000 US $ annually which amounts to more than 50% of the Reserve's yearly budget.

The use of only organic fertilizers in fields (liquid manure, 3-5 tonnes/ha) will also enable farmers to produce ecologically pure feeds for the stalled keeping of cattle, but in today's Russia this however will not be reflected in the market price of the meat produce and thus provide no stimulus for cattle-breeders to use advanced farming technologies which are environmentally safe and do not impoverish soils. In this respect, the Reserve officers try to convince farmers and conduct their training on a systematic basis, but they do this work without due enthusiasm because these activities are given no governmental stimulation and remuneration.

A highly important factor of economic cooperation between the Reserve and local farmers is planned hay-making and grazing of their cattle in the Reserve area. For the Reserve this work is merely a long-term natural experiment, whereas for the farmers this is the only possibility to tend grazing cattle and make reserves of ecologically pure forage for the winter stalled keeping of cattle and, consequently, have the ecologically pure meat and milk produce in their households. At this stage we cannot say with any degree of certainty whether such an ecologically safer diet is beneficial for human health because in this respect no special tests or examination have been conducted.

KAZATSKY (Medvedensk District, Kursk Region) was set up in 1935 with the total area of ~~698~~ 1638 ha. The Reserve area was enlarged by inclusion of the Kazatsky forest (512 ha) (Zozulin, 1949) in 1937 and further increased in 1946 by addition of the Dalneye Pole fallow land (294 ha) which within 50 years of protection has been totally transformed into a steppe. This is a convincing demonstration of the possibility of ecological restoration of steppes on the basis of existing protected areas. In 1953 the Reserve area was increased by another 100 ha as a result of specification of the factual Reserve area while conducting the first forest registry.

The resources for further increase of the Reserve area are meager - possibly 43 ha owing to the inclusion into the Reserve territory of ravines non-used by farmers in the protective zone, as it happened to the Dalneye Pole fallow land. At present, this work may be done within two months provided there is funding of 6000 USD.

The hay made at the Kazatsky area during scheduled hay-making is supplied not only to neighbouring villagers but also to residents of the district centre town and pedigree animal-breeding farms of the Kursk and Belgorod Regions. The latter circumstance is related to the fact that the elite bull sires from which sperm is taken for freezing and subsequent insemination of cows must be fed solely on ecologically pure forage from protected steppes. Any other feedstuffs are undesirable because they reduce the sperm quality which in turn negatively affects the fertilization process.

In order to maintain natural purity and established standards in protected areas the Reserve officers have sometimes disputes with local farmers because of their habit to burn the straw remaining in fields after harvest. This pollutes air, deteriorates the upper soil layer, kills the soil micro- and mesofauna, may become the cause of fire in strongly protected parts of the Reserve and even result in death of people in the fire. Our attempts to persuade farmers to stop such practices through explanatory work have been unsuccessful since for them the burning of the straw was faster and more economical than the purchase of machinery for its fragmentation. In 1994 the Reserve administration in cooperation with the regional committee on ecology, head of the Kursk regional administration and the ecological committee of Regional Duma worked out a document which was issued as the instruction prohibiting burning of straw in fields of Kursk Region which was in conformity with the "Regulations on Fire Prevention" currently in force in the Russian Federation. As a result, the Reserve officers started to impose penalties on those who infringe this regional decree, though it is not a totally justified measure.
Possible the farmers would not act banefully in their fields, if they had sufficient funds for buying necessary equipment for straw cutting.

YAMSKOY (Gubkin District, Belgorod Region) with the area of 489 ha was organized 1935. In 1940 and 1953 it was enlarged to include ml Vishnyaki with a chalky mound. In 1980 the agricultural cooperative "Serguievsky" decided to transfer to the Reserve 58 ha of land (steppes, grassland, ravines with chalky denudations). In 1990-1995 the ore mining and processing enterprise "Lebedinsky" purchased all lands of the "Serguievsky" cooperative transforming the latter into a subsidiary farm. The major task of this farm is to supply the enterprise workers and population of the town of Gubkin with high-quality foodstuffs and also to export part of such foods. For example, the sunflower seed oil produced by this farm using an Austrian technology has been recognized best and given the first prize at the London Agricultural Fair in 1994.

To raise its subsidiary farm efficiency the Lebedinsky enterprise transfers land to farmers on a competitive basis in the protective zone, pays their training in Austria and provides them with funds for building and purchase of required equipment and machinery.

Recent negotiations between the Reserve and Lebedinsky administrations on the problem of rational use of the territory surrounding the Yamskoy section of the Reserve have been successful. They made it possible to increase the area of the Yamskoy steppe by 60 ha by transferring to the Reserve the lower part of the Kuchugura ravine and ml Eremenko (steppes, cretaceous sediments, grassland, habitats of steppe ground squirrel, a unique woodland).

BARKALOVKA (Gorshechensky District, Kursk Region) was set up in 1969. It includes ML Gorodnoe (327 ha) and ML Barkalovka (38 ha), a separate enclave 2 km away.

Of the 1060 plant species growing at the Reserve 86 are referred to especially rare and of these 11 are included in the Russian Red Data Book: Orchis orbiculata, Schiverekia podolskii, Thymelus julii, Paeonia tenifolia, Androsace koso-poljanskii. These five species grow in the Barkalovka area which is of exceptional significance for the Reserve. However, rigorous long-term protection of this territory without due account for biology and ecology of these rare plant species associated with grazing has led to degradation of their populations. In this context, three years ago the Scientific Board of the Reserve decided to approach the joint-stock company "Vatutin" with the request for a periodic controlled short-term annual pasturing of large flocks of sheep (up to 600 heads) for creating in the Reserve favourable conditions for rare plant species. This request was met and after a three-year period these plants are no longer endangered thanks to the mutually advantageous cooperation of the Reserve with the Vatutin joint-stock company. An analogous problem is being solved in the BUKREEVY BARMY area (Manturovsk District, Kursk Region) where instead of sheep farmers take for controlled grazing a herd of 100 cows.

With a financial support of 5000 US $ it would be possible to further enlarge this protected area by 25-30 ha by including into its territory the fascinating virgin steppes on chalky slopes.

New Conditions - Novel Strategies

Biosphere reserves in each natural region which they characterize must embrace the entire complex of ecosystems in this region, to serve the purpose of a standard sample for referencing to determine the extent of perturbation of economically exploited soils and to perform the following socially significant functions: monitoring, research coordination, nature protection, ecological education.

While meeting all of the above-mentioned requirements, the Central-Chernozemic Biosphere Reserve did not have for long years in the sphere of its research and protection any fairly representative, and unique for the Central Chernozem region, lacustrine and flood-land areas, highland oak groves, relict cretaceous pine forests.

Furthermore, the Reserve territory accounted for no more than 0.14% of the total area of Kursk and Belgorod Regions which is below the international standard for economically advanced countries requiring 3% of the country's territory to be specially protected in order to meet its population needs in active leisure time, tourism, contacts with natural environments, education of children.

In this context, in 1992 the Reserve administration submitted a respective programme to the regional committees on ecology and the administrations of Kursk and Belgorod Regions and developed strategies aimed at further expansion of the Reserve territory. In these documents two major phases (stages) of work were outlined:

Phase 1 (1992-1994). Expedient organization of protected areas in regions with land used for agricultural production. This was to be done before coming into force of Federal law on land ownership, otherwise the Reserve would have to buy the land owned by farmers. Such areas included: Lysye Gory and Stenki-Izgorya with areas of 170 and 391 ha, respectively.

LYSYE GORY (Gubkin District, Belgorod Region). Long preparatory work and contacts with the district and regional administration made it possible to transfer the required land to the Reserve without conflicts, as this land belonged to the state with the Starooskolsky forestry as the land tenant. Negotiations with two private farmers to agree upon the status of the protective zone were difficult because of a number of restrictions for farmers regarding the land use (application of herbicides etc.). As a result a 1-km wide (instead of 3-km) protective zone was established. The decision on the organization of a 170-ha protected area was passed by the Federal government on September 9, 1993 and came into force on February 1, 1994. This area includes a deciduous forest (24 ha), forest plant species and flood-lands, but of special value are grassland steppes and petrophytic communities on cretaceous denudations. In perspective, the Lysye Gory area may be enlarged to include an interesting isolated morphologic landscape Romanovo with a natural forest and a grass steppe (20 ha) which is at 0.5-1.2 km from the main area and mostly makes part of the 1-km wide protective zone.

STENKI-IZGORYA (Novooskolsky District, Belgorod Region). A unique natural complex on the left bank of the Oskol river characterized by a large diversity of its biota. This locality was first proposed to be transformed into a protected area by B. M. Koso-Poljanski as early as in 1931.

During 1993-1994 a preliminary agreement was reached on the transfer 391 ha of land to the Reserve from the following land tenants: Kolos joint-stock company (30 ha), State pedigree poultry farm (73 ha), Novooskolsky forestry (168 ha). But this nature reserve was not organized, because of the Russian President's decree declaring null and void most of the articles of the "Land Code". Immediately after certain discords emerged in the discussion on alienation of pastures and grasslands from the Kolos joint-stock company. In the new legislative framework the Reserve had to reach individual agreements with each of 500 shareholders. To do this two years had been wasted before legislative amendments permitted a compromise between the Reserve administration and the shareholders through transformation of some land into a protective zone in which a limited grazing of domestic animals was allowed.

In conformity with the decision of Federal government (660-p) of May 17, 1995 a new Reserve section was set up with an area of 267 ha instead of 391 ha planned initially. A protective zone of 337 ha is also established.

Phase II (1995-1997). Organization of protected areas on the lands which are "ill-suited" for farming purpose and whose alienation will not be problematic because in most cases these lands are in the state or municipal ownership.

Thus, the Reserve has expanded its territory by 500 ha for the last two years and plans to establish another 4 protected areas (over 1800 ha) by 1997: Oboyansky, Lutov Les and Zorinskie Bolota (Oboyansk District, Kursk Region) for which purpose the preparation of necessary documentation (in conformity with the instruction of the head of Kursk regional administration, No.220 of August 3, 1993) is nearing its completion. In this case it will be possible to save from destruction a tract of watershed relict wetlands with the sphagnous cover which is unique in the European forest-steppes. Watlands are represented by small losed depressions surrounded by fields. Ploughing of depression edges was conducive to their sludging, disappearance of sphagnous associations and rare plant species. This was the cause of transformation of 20%

of the sphagnous marshes into the sedge-reed grown beds within the period of 1968-1993. Only numerous protests through mass media and explanatory work among farmers made it possible to stop this negative process and proceed to setting up a protected area.

Conclusion

1. The relations between the Reserve administration and land tenants are contradictory which is due to different interests in achieving the final goal - protection biotops or increased agricultural output.

2. In most instances our experience demonstrates that there are many possibilities for reaching a compromise because both sides are interdependent (regime hay-making, cattle grazing to preserve rare and Red Data Book plant species). When there is no room for a compromise (like in the case of straw burning in fields, poaching using cars etc.), it is necessary to use the letter of the law to penalize the perpetrator.

3. In Russia the rare biotops may be best preserved only in biosphere reserves because these areas are forever excluded from any economic use of the soil. When however certain land uses are brought about, they must be done only on the basis of the result of relevant research and recommendations specifying the optimal regimes for definite biotops and ecosystems.

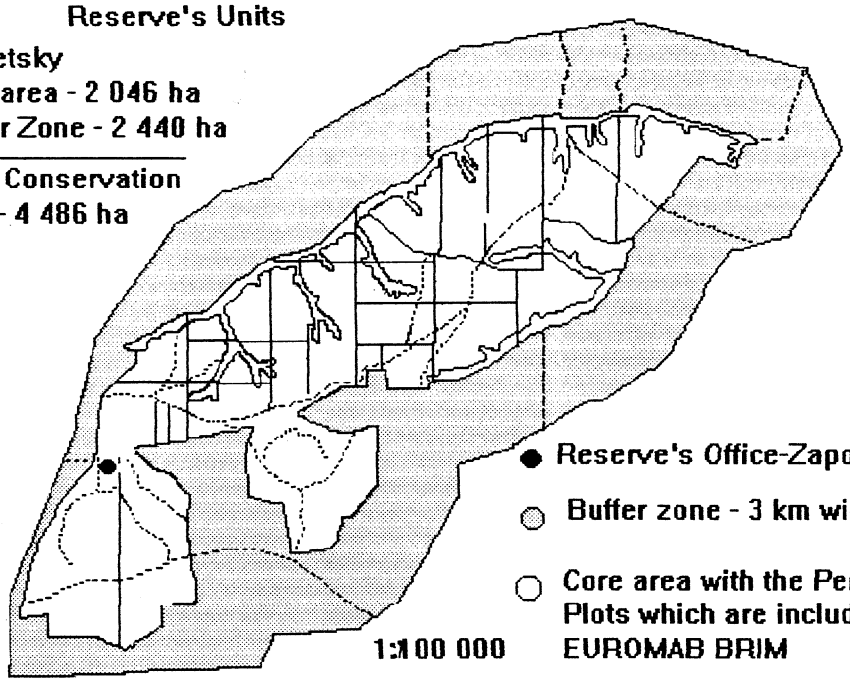
4. When it is impossible to set up compact and sufficiently large protected areas (reserves) it is necessary to organize cluster protected areas of the Central-Chernozemic Reserve type including several small sections. Of course, these will be "islets in the ocean" of agro-industrial landscape but still live islands. A network of small reserves is highly efficient in densely populated regions but it requires 2-3 times as much funds for its maintenance because of a large stretch of their boundaries and long distances separating them.

5. The network of reserve areas preserving the entire biological diversity of particular region(s) may be used as the ground for subsequent restoration of perturbed ecosystems after the recovery of Russia from the current economic crisis.

Reserve's Units

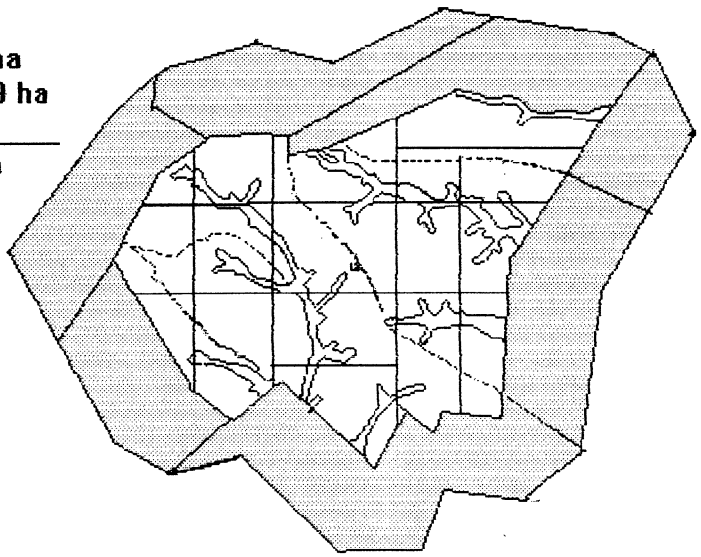
1. Streletsky
   Core area - 2 046 ha
   Buffer Zone - 2 440 ha

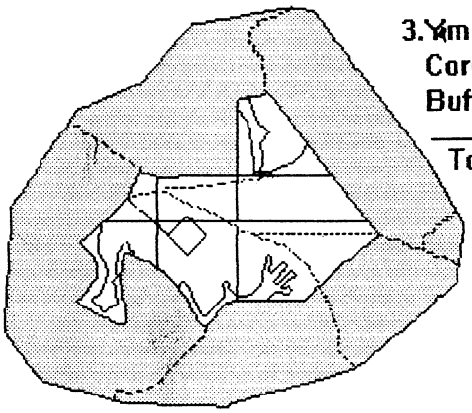
   Total Conservation area - 4 486 ha



2. Kazatsky
   Core area - 1 638 ha
   Buffer Zone - 2 079 ha

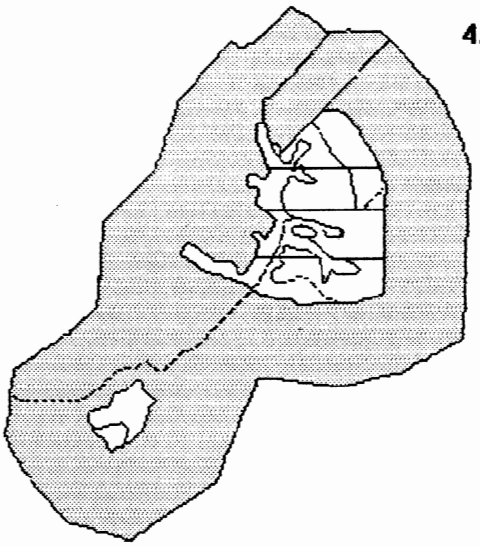
   Total Conservation area - 3 717 ha





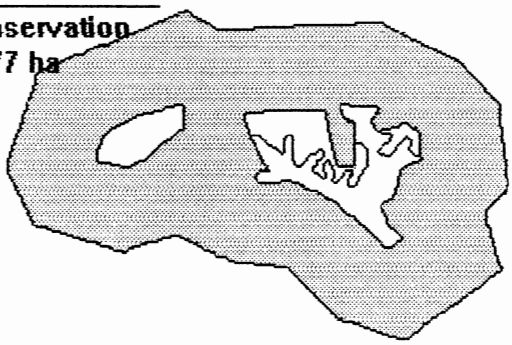
3. Ymskoy
   Core area - 566 ha
   Buffer Zone - 1 400 ha

   Total Conservation area - 1 966 ha



4. Barkalovka
Core area - 365 ha
Buffer Zone - 1 746 ha
Total Conservation area - 2 111 ha

5.Bukreevy Barmy
Core area - 259 ha
Buffer Zone - 1 418 ha
Total Conservation area-1 677 ha



6. Lysye Gory
Core area - 170 ha
Buffer Zone - 860 ha
Total Conservation area - 1030 ha