



Oleksandr Boiko · Oleksii Honchar ·
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Protected area in Ukraine

The nature of changes in the biodiversity of
protected areas of the Cherkasy region has been
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Imprint

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17 Meldrum Street, Beau Bassin 71504, Mauritius

Printed at: see last page

ISBN: 978-620-0-61967-9

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**NATIONAL ACADEMY OF AGRARIAN
SCIENCES OF UKRAINE**

**CHERCASY EXPERIMENTAL STATION
OF BIORESOURCES**

Olexander Boiko, Olexey Honchar, Oleksandr Havrysh, Tetyana Osokina

Protected area in Ukraine



Cherkasy – 2021

UDC 502.7.502.4

O. Boiko, O. Honchar, O. Havrysh, T. Osokina Protected area in Ukraine:
Monograph. - Cherkasy: Cherkasy experimental station of bioresources NAAS, 2021.
- 133 p.

The book provides a brief description of the biodiversity of region as a whole and separately for the objects of nature reserve fund of general national importance located in the Cherkassy region. The paper used literature and scientific data, own research on biodiversity of protected areas of Cherkassy region, describes the conservation and trends of biodiversity, identifies ways to mitigate the threat of anthropogenic impact.

For scientists, teachers, graduate students and students of biological profile, specialists, as well as managers of agricultural enterprises and forestries.

Reviewers:

V.V. Lavrov - Doctor of Agrarian Sciences, Professor, Head of the Department of General Ecology, Bila Tserkva National Agrarian University.

S.I Deriy - Candidate of Biological Sciences, Associate Professor of Ecology and Agrobiological, Institute of Natural Sciences, Cherkassy National University named after Bohdan Khmelnytsky.

Considered, approved and recommended for publication at the meeting of the Academic Council of the Cherkassy Research Station of Bioresources of NAAS of Ukraine, minutes № 1 from 01.22.2021

UDC 502.7.502.4

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ISBN

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LIST OF TERMS AND ABBREVIATIONS

DP - dendrological park.

NNP is a national nature park.

NRF - nature reserve fund.

NR - nature reserve.

NPLS is a natural park of local significance.

RLP is a regional landscape park.

RLS - is a reserve of local significance.

RNI - a reserve of national importance.

RSEN is a regional scheme of the ecological network.

Power lines - power lines.

SHW - solid household waste.

WCF- the World Conservation Fund

Agrocenosis - artificially created and regulated by man biocenosis, characterized by high productivity of different species of plants or animals.

Anthropogenic factors - complexes of changes introduced into nature by human economic activities that affect the organic world, including animals and plants.

Anthropogenic load - the degree of direct and indirect impact of human economic activity on nature as a whole or on its individual components (landscape, species of organisms, etc.).

Anthropogenic pollution - pollution caused by the biological existence and economic activities of humans.

Biocenosis is any collection of interconnected populations of microorganisms, plants, or animals that inhabit a particular area or habitat.

Biodiversity is a measure of relative diversity among a collection of living organisms that are part of an ecosystem.

Biota - a set of all living organisms that inhabit a certain area.

Evolution is a historically irreversible process of progressive development of the organic world through the gradual adaptation of living systems.

Ecosystem - a set of living organisms, interconnected by trophic links, and inanimate components of their environment, which are involved in the processes of metabolism and energy.

Ecology - a branch of biology, the science of patterns of relationships between populations of animals and plants and the environment.

Habitat - the territory of land or water with homogeneous living conditions, occupied by a certain biocenosis. For example, the habitat of the roe deer population in the pine forest of the Middle Dnieper.

Landscape - a natural geographical complex, which is defined as a general view of the terrain, landscape.

Monitoring - a comprehensive system of observation and control of changes in the state of the environment under the influence of anthropogenic factors.

Natural environment is an integral element of the reproduction of material values, which at the same time performs the function of living space and natural resources.

Nature reserve fund - reserves, biosphere reserves, national parks, reserves, natural monuments (up to 2 hectares), reserves, landscape parks, protected natural objects of artificial origin.

Natural resources - components of nature that can be used to meet the needs of society (water and land resources, air, rocks, minerals, solar energy, plants and animals).

Pastures are a type of agricultural land, a plot of land whose vegetation is used for cattle grazing. There are also hunting grounds.

Phytocenosis - a set or group of plant organisms in a relatively homogeneous area, interacting with each other, with animals and the environment.

Relics - rare plants or animals that exist in a limited area and have survived from past geological epochs, in which they were quite common. The relics in Ukraine include the common ruff, bandaging.

Recreational area - an area that is used for recreation, mass recreation, tourism and excursions. There are short-term and long-term recreational areas (national parks, forest tracts, etc.); part of the space of the natural environment, intended for recreation and tourism.

Reclamation - a system of measures to restore economic value and comprehensive improvement of land, disturbed in the process of anthropogenic factors. There are two stages of reclamation: technical and biological.

Reserve - a protected natural area with a regime close to the reserve, where the main object of protection is one of the elements of the natural complex; a territory or water area within which natural objects of ecological, genetic, scientific or cultural value are protected.

Soil degradation is a process that leads to soil loss of fertility under the influence of water and wind erosion, salinization, flooding, waterlogging, etc.

Soil erosion - the destruction of soil cover due to denudation processes that lead to soil destruction.

Water erosion - washing away of soil and underlying rocks by streams, melt and rainwater.

Zoocenosis - a set of closely related species of animals, formed in the appropriate space; component of biogeocenosis.

Introduction

The concept of the National Program for the Development of Protected Areas of Ukraine states that to preserve natural complexes, ecosystems, certain species of flora and fauna, unique and typical landscapes, it is necessary to accelerate the formation of an extensive network of territories and objects of nature reserves [10]. As practice shows, conservative methods of preserving the natural environment remain the main methods that protect the gene pool of flora and fauna, unique natural ecosystems and landscapes.

One of the key forms of protection of species of wild flora and fauna - the so-called biodiversity - is the creation of protected areas. Currently, three main environmental concepts coexist in the nature reserve business of Ukraine: the concept of nature reserves, the concept of a national park and the concept of a natural monument [7].

Biological diversity (biodiversity) of fauna and flora is the basis of renewable natural resources that provide humanity with food, raw materials, medicines and more. In addition, biodiversity is valuable regardless of its material value, as it ensures the functioning of natural ecosystems, ie the environment. Therefore, the loss of biodiversity not only leads to negative economic consequences, it causes disruption of natural living conditions for all species of biota and for humans. With the recognition of the ecosystem organization of the biosphere, it is common to distinguish three main levels of biodiversity: genetic, species and ecosystem, taking into account the links between different levels of the biological hierarchy [16].

All these connections and conditions are broken as a result of human activity at the local level, the transformation of natural and territorial complexes and global change. This necessitated the allocation of biological and landscape diversity.

One of the ways to solve the problem of reproduction and conservation of biodiversity is to optimize the ratio of areas of natural plant complexes and anthropogenic areas, including agricultural landscapes [32].

Protected areas play a key role on Earth in preserving its natural framework, reproducing life and maintaining biodiversity.

Almost every day, the world's media voice the problems of climate change, ozone depletion, pollution of continents and oceans, desertification, acid rain, degradation and destruction of biodiversity.

Ukraine did not escape these problems either. It is the leader in Europe in the area of eroded land (about 30% of agricultural land) and plowing (arable land covers 55% of the territory). The area of protected lands is 2.5 times smaller than the European average. Conversely, air pollution is three times higher, and the amount of clean water per capita is ten times lower [8].

The most important international instruments governing activities for the conservation of biological and landscape diversity are: the Convention on Wetlands of International Importance, Mainly as Waterfowl Habitats (Ramsar, 1971; Paris, 1982, 1987). The Convention Concerning the Protection of the World Cultural and Natural Heritage (Paris, 1972), the Convention on International Trade in Endangered Species of Wild Fauna and Flora - CITES (Washington, 1973), the Convention on the Conservation of Migratory Species of Wild Fauna (Bonn, 1979), the Convention on the Conservation of European Wildlife and Natural Habitats (Bern, 1979) [44], the Convention on Biological Diversity (Rio de Janeiro, 1992) and the European Landscape Convention (Florence, 2000). Ukraine is a party to most of these international legal acts and implements their tasks by harmonizing the legal framework and the corresponding greening of nature [35].

The international program states that biodiversity conservation is not so much an inventory of species as a new systemic solution to these global environmental, political, economic and social problems related to a number of complex tasks: the revision of international and national legal and financial relations. ; harmonization of economic, environmental and legal aspects at the international and national levels in accordance with the concept of sustainable development; radical changes in production and consumption; transition to green technologies; creation of national biodiversity programs as a mandatory element of public policy; shifting priorities towards environmental, ecosystem activities in nature management; substantiation of priorities and criteria of inexhaustible multi-purpose use of biodiversity and selection of indicators for its monitoring; review of existing networks of nature reserves.

The experience of European countries shows the need for mandatory compliance with at least three requirements, namely: the degree of plowing of land, which should not exceed 20-30% of the state, a high percentage of reserves and relevant legislation. For example, in Austria the protected area is 25%, in Germany - 24%, in Switzerland - 18.5% [14].

Over the last decade, the number of protected areas and their area in the world has more than doubled: now more than 12% of the land surface is protected [18].

Cherkasy region, which is located in the very center of Ukraine, does not stand aside from world trends.

Currently, the nature reserve fund of Cherkasy region has 547 territories and objects of the nature reserve fund, including 22 objects of national importance and 525 - of local importance, occupying an area of 64.2 thousand hectares. The nature reserve fund of Cherkasy region includes: Biloozersky and Nyzhnosulsky National Nature Park, Kaniv Nature Reserve, Sofiyivka Dendrological Park, Cherkasy Zoological

Park, Trakhtemyriv Regional Landscape Park, 231 reserves, 198 natural monuments, 60 parks - monuments of landscape art, 52 - protected tracts. [9]

The area of protected areas and facilities is 3.1% of the total area of the region (reserve indicator). In terms of districts and cities of regional subordination, the reserve rate ranges from 0.1 to 13 percent. In two districts, the reserve is higher than the average in Ukraine (Kaniv, Zolotonosha) and one is close to it (Chornobayiv). [24, 29]

The low level of protection is due to the significant plowing of lands. In particular, the area of agricultural land in Cherkasy region is 1,451 thousand hectares (70% of the total area), of which arable land - 1,271.6 thousand hectares (88% of the area of agricultural land).

The percentage of plowing for most areas ranges from 62 to 80%. [8]

The creation of each new protected object is preceded by long and painstaking work of scientists, because in each case it is necessary to assess the state of preservation of the territory, its representativeness, scientific, environmental and recreational value.

Without these basic data, it is impossible to carry out effective management of protected areas, to develop scientifically sound measures to protect the most valuable and most vulnerable populations, species, habitats, ecosystems.

The author's team, in this work, set the following main tasks:

- provide a general description of the biodiversity of the region;
- to analyze the state of the will in Cherkasy region;
- to provide scientific characteristics of biodiversity on the territory of the objects of the nature reserve fund of the region of national importance;
- provide appropriate recommendations and ways to mitigate threats to negative impacts on biodiversity.

Chapter 1

Physical and geographical characteristics of Cherkasy region

Cherkasy region is located on the Eastern European plain, in the middle reaches of the Dnieper. The area of the region is 20.9 thousand km² (3.4% of the total area of Ukraine).

The territory of the region as a whole is flat and is conditionally divided into two parts - right-bank and left-bank. Most of the right bank is located within the Dnieper Upland with the highest point of the region, which has an absolute height of 275 m above sea level (near the Monastery), sometimes hilly, cut by rivers, ravines and gullies. In the part of the right bank adjacent to the Dnieper is the marshy Irdino-Tyasmin lowland. The Kaniv-Moshnolgir ridge stretches for 70 km along the Dnieper valley. Significant elevations of the terrain give the territory a mountainous character. This area is called Kaniv Mountains and Moshnogory [3, 10].

The territory of the region stretches from southwest to northeast for 245 km, from north to south - for 150 km. The northernmost point lies on the east. d.), southern $\phi 07^{\circ}$ n. sh., $32\phi 14^{\circ}$ north of the village. Kononivka, Drabiv district (50 east d.), $\phi 07^{\circ}$ n. sh., $30\phi 27^{\circ}$ – south of the village Kolodyste, Uman district (48 west - northwest of the village of Zhovtneve, Monastyryshche district, east), east - southeast of the village. Stetsivka, $\phi 36^{\circ}$ n. w., $29\phi 03^{\circ}$ (49 east.). $\phi 52^{\circ}$ n. sh., $32\phi 00^{\circ}$ Chyhyryn district (49 Cherkasy region borders on the north with Kyiv (border 340 km), on the east - with Poltava (212 km), on the south with Kirovohrad (388 km), on the west - with Vinnytsia (124 km) areas.

In general, the natural and climatic conditions of the region are favorable for the development of many species of biota, intensive agriculture, and population life. Therefore, the region is a fairly developed industrial and agricultural and sparsely forested area. It is known that in order to preserve biodiversity, it will be most effective to take measures at the level of relevant natural ecosystems. However, the management of socio-economic activities is carried out by territorial taxa of administrative division, the boundaries of which usually do not coincide with the taxa of natural ecosystems. This is currently one of the most difficult problems of harmonizing nature management with environmental protection, including biodiversity.

Natural and climatic conditions and resources

Climate

The climate of the region is temperate-continental with an average annual air temperature of 7.0 - 7.7 ° C. The coldest month of the year is January with an average temperature of 5.5 - 6.1 ° C below zero, the warmest - July with an average temperature of 19.2 - 20.8 ° C. The absolute minimum air temperature reaches - 34 38 ° C and even lower.

The absolute maximum of 36 - 39 ° C occurs in July-August. A steady transition of the average daily temperature through 0 ° occurs on March 15-18 and November 22-24. About 242 - 255 days a year the air temperature exceeds 0 °.

According to the Cherkasy Regional Center for Hydrometeorology, compared to the middle of the twentieth century. winters warmed by 1.5 °C, and from 1948 to 1973 there was intense warming - by 0.8 °C, from 1973 to 1983 - the period of adaptation, from 1984 warming intensified again, reaching in 2003 - 2004 0.7 °C. The recurrence of cold winters is declining: before 1978 there were 12, after 1978 - 6, for the last ten years - only 2.

The growing season of plants on average begins on April 4-8, when the average daily temperature exceeds + 5 ° and ends on October 29 - November 1. The total duration of the growing season is 200 - 212 days. Active plant growth begins at an average daily temperature of more than + 10 °, there are 160 - 170 such days a year, and with temperatures above + 15 ° - 112 - 126.

The sum of days with temperatures above + 10 ° during the growing season reaches 2550 - 2600 ° in the western regions of the region, in the rest of the territory - 2650 - 2900 ° heat. Frosts in the air stop on average April 18 - 22 in the east of the region, in the west - April 26 - May 2. The latest frosts in the air are observed on May 21 - 25, in Chyhyryn district - on May 15. On average, the first frosts in the air - from October 10, in Zhashkiv district - on November 21. The first frosts are observed in the western left-bank areas on November 5 - 9, in the rest of the region - on November 16 - 29. The average duration of the frost-free period is 159 - 171 days, the shortest - 113 - 130, in Chyhyryn district - 154 days.

The amount of annual precipitation in Zolotonosha, Smilyansky and Khrystynivsky districts is about 510 mm, in the rest of the territory - 450 - 480 mm. In some years, the annual rainfall throughout the region is observed in the range of 670 - 784 mm, the minimum - 255 - 390 mm. Precipitation during the year in the region is unevenly distributed: most of it in June - July (90 - 100 mm), the least - in January - February (up to 100 mm). The average rainfall during the growing season ranges from 260 to 25 mm.

Stable snow cover is formed on December 14-22 and rises on March 21-23. The period with stable snow cover in the south of the region lasts 73 - 81 days, in the rest of the territory - 82-95 days. Snowmelt begins on April 10, although in some places it happens on April 15 - 20 (Zhashkiv, Uman). Western and north-western winds with an average speed of 3 - 8 m / s prevail.

Winter begins with an average daily air temperature below 0 ° in late November. The beginning of winter is characterized by unstable

weather with frequent change of frosts to thaws and repeated disappearance of snow cover. Winter is mostly mild. A characteristic feature of the winter season is the presence of frequent thaws, when the air temperature rises somewhere up to 8 - 10 ° heat. In winter, gloomy weather with frequent but insignificant precipitation prevails. In the cold period of the year, along with solid precipitation, it can also rain. The cold period accounts for about 100 - 130 mm, which is 20 - 25% of their annual amount.

A characteristic feature of spring is the intense rise in temperature. In the first decade of April there is a transition of the average daily air temperature above + 5 °, and from the end of April, when the air temperature exceeds + 10 °, the active vegetation of all plants begins. However, in the spring there is a return of cold, in May there may be frost.

Winter begins with the average daily air temperature

Summer begins in mid-May and lasts until mid-September. In summer, the weather is initially warm, and in July - August in some years it becomes hot. Wet western winds, which prevail in summer, bring a significant amount of precipitation. There are 10-12 days with precipitation over 0.1 mm in May, 12-12 in June-July, and 8-10 in August-September. Thunderstorms with lightning and hail, which are often accompanied by storms, are a characteristic feature of the summer period. In some years, long periods of drought are observed, as a result of which productive moisture reserves in the soil are lost. Therefore, atmospheric drought is often accompanied by soil drought.

Autumn comes from the second decade of September to October 5-10. In the pre-autumn period between summer and autumn and the first half of autumn the weather is dry, warm, especially warm is September. The rains begin in late October. During the autumn there is a general decrease in air temperature. A sign of the end of the growing season is a decrease in the average daily air temperature to + 5 °, which occurs in late October [4, 23, 31].

Thus, the climate of Cherkasy region is temperate-continental. In general, the average temperature in January reaches -5.9 °, in July - + 20 °, the average annual temperature - + 7.6 °. In some years, there is a significant deviation of temperatures from perennial averages. The growing season lasts 205 days, the period of active vegetation of plants (at temperatures above + 10 °) - 160 - 165 days.

Relief

According to geomorphological features in the Cherkasy region, there are three main types of relief [58]:

1. Ploskorivny (Zolotonosha, Drabiv and Chornobayiv districts).
2. Wide-wave valley-beam water-erosion (Khrystynivsky, Zhashkivsky, Umansky, Mankivsky and Talnivsky districts).

3. Narrow-wave valley-beam water-erosion (Kaniv, Korsun-Shevchenkivsky, Smilyansky districts, part of Chyhyryn and Lysyansky districts).

The region is characterized by a complex geomorphological structure of landscapes, formed as a result of the interaction of various natural complexes and exogenous forces during the geological history of the region. According to the geomorphological structure, this territory can be divided into two sharply different parts - the Right Bank and the Left Bank.

The right bank of the region occupies the central part of the Ukrainian crystalline massif, and the Left Bank - the southwestern part of the Dnieper basin. The western part of the region, where Khrystynivsky, Zhashkivsky, Umansky, Mankivsky administrative districts are located, is characterized by a flat plain relief. The plateau is cut by a network of shallow wide ravines with gentle slopes. Erosion on most of the soil cover of this region has a slight development.

The wide-wave type of relief is typical of most of the Right Bank of the region. The root plateau here is divided by an erosion network. Bright - deep, long, sparsely branched, with wide slopes. Surface water runoff and erosion processes are more pronounced. In Korsun-Shevchenkivskyi and Kanivskyi districts, bordering the Dnieper valley, the relief is the most difficult: narrow-wavy with a transition to mountainous and conical, and in some places has the appearance of erosive mountains.

The surface of the Right Bank in the past has been very intensely eroded during the pre-glacial and glacial periods. The left-bank plain, which is an ancient accumulative terrace of the Dnieper, is leveled and characterized by flat and slightly undulating landforms.

The watersheds of the western right bank are poorly dissected by river valleys and a network of beams. In this part the rivers Gorsky Tikich, Yatran, Revukha, Umanka flow. To the east of the Dnieper, the nature of the relief changes, the watersheds narrow, because the length of the slopes often exceeds the width of the plateau, the number of beams increases, the slopes of which are often cut by ravines.

Along the Dnieper valley for 70 km stretches Kaniv-Moshnogorsky ridge, which rises above the river level at 160 - 180 m, on its slopes has numerous. The relief structure is especially complex at the mouths of the Rossi and Vilshanka rivers. At the mouth of the ravines, large areas are occupied by removal cones created by rainwater. The relief of pine terraces of the Dnieper is characterized by sand dunes and manes.

The left-bank part of the region is located in the Dnieper lowland, at the base of which at a depth of 4 thousand m is a crystalline basement covered with sedimentary rocks. It is a flat moraine terrace, which turns

into wavy slopes only near rivers. Surface runoff is almost absent, and therefore often formed saucers, where stagnant water melts.

The micro-relief of the territory in the form of micro-depressions and saucers is most pronounced on the Left Bank.

According to climatic conditions, relief and vegetation Cherkasy region is divided into four landscape areas:

- Left-Bank Dnieper Forest-Steppe,
- Right-bank Dnieper Forest-Steppe,
- Forest-steppe part,
- South-western and southern forest-steppe part.

Thus, the relief of the region is water-erosion in its modern forms is very heterogeneous.

The left-bank Prydniprovskya Forest-Steppe has a sandy strip bordering the Dnieper, has a hilly relief of yellow and white river sand and a forest zone with forests spread on white sands on the first and second terraces of the Dnieper and its tributaries (Supa, Zolotonoshka, Sula). The right-bank Prydniprovskya Forest-Steppe resembles Ukrainian Polissya. There are meadow flat-level terraces with sod and meadow soils, next to them - hilly and pine terraces with sod-slightly podzolic and sod-podzolic soils [9,27,53]. Consider the soils in more detail below.

Soils and land resources

The soil cover of the region is quite diverse (Table 1).

1. The structure of the land fund of the region

Types of lands and lands	Area of lands and lands, thousand hectares				
	2014	2015	2016	2017	2018
Total area	2091,6	2091,6	2091,6	2091,6	2091,6
1. Agricultural lands, of which:	1450,8	1451,0	1451,0	1451,0	1451,0
Arable	1271,3	1272,0	1272,0	1272,0	1272,0
Perelogi	9,0	8,5	8,5	8,5	8,5
Perennial plantings	27,4	27,3	27,3	27,3	27,3
Hayfields	65,1	64,8	64,8	64,8	64,8
Pastures	78,6	78,4	78,4	78,4	78,4
2. Forests and other areas covered	338,6	338,6	338,6	338,6	338,6
3. Built-up land	84,4	84,4	84,4	84,4	84,4
4. Open wetlands	30,5	30,5	30,5	30,5	30,5
5. Open wetlands	15,4	15,4	15,5	15,4	15,4
6. Other lands	171,9	171,7	171,7	171,7	171,7
Total lands (land)	1955,8	1955,8	1955,8	1955,8	1955,8
Areas covered by surface waters	135,8	135,7	135,7	135,7	135,7

* according to the Main Department of the State Geocadastre in Cherkasy region

On the left bank, deep low-humus chernozems are widespread. There are almost no podzolic soils. However, brackish and saline chernozems, meadows and peat-swamp soils, lowland peatlands are very common [8, 67].

The main parent rock is mainly hard loam forest, which in the east of the region is gradually becoming light loam. Along the rivers, soils formed on alluvial deposits.

Typical low-humus chernozems and regraded chernozems predominate, covering 73.6% of the total soil area. The largest areas of typical chernozems are spread on the left bank, many of them in Zhashkiv, Kamyansk, Kaniv, Lysyansk, Monastyryshche, Talniv, Chyhyryn, Shpola districts. Dark gray and light gray podzolic soils make up 13.4 hectares. or 7.3%. Other types of soils - from 1.2 to 2.5% of the area in Horodyshche, Zvenyhorod, Mankiv, Smilyansk, Uman, Khrystyniv districts.

In the land fund of Cherkasy region (2091.6 thousand hectares) agricultural lands reach 1451.0 thousand hectares, of which arable land - 1272.0 thousand hectares.

Mineral raw material base Mineral raw material base

It is known that the impact on the environment significantly depends on the type of nature and its intensity. Compared to agriculture, the use of forest resources is less threatening. At the same time, as of January 1, 2020, there were 284 mineral deposits in Cherkassy region (including 7 objects of accounting for complex deposits), of which 94 are being developed (Fig. 1). [31]

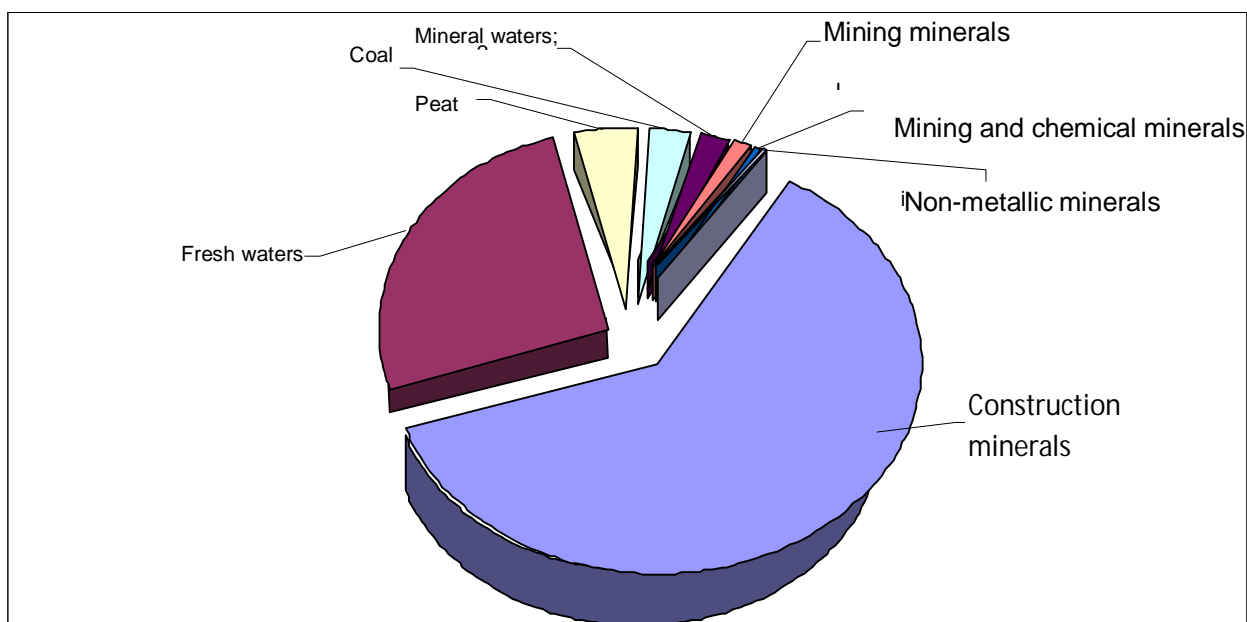


Fig. 1 The state of mineral reserves

Input data to fig. 1.

Construction minerals	175	61,62 %
Fresh water	74	26,06 %
Peat	14	4,93 %
Coal	8	2,82 %
Mineral waters	7	2,46 %
Mining minerals	4	1,41 %
Mining and chemical minerals	1	0,35 %
Non-metallic minerals	1	0,35 %

In 2019, in the Cherkasy region, deposits of raw materials for brick and tile, building stone, construction sand, and facing stone were mainly developed.

Information on the mineral resource base is presented in table. 2.

2. Mineral resource base

Types of minerals	Total number of deposits		Under development One		Measurement	Extraction of raw materials in 2019	Balance reserves as of 01.01.2020
	01.01. 2019y	01.01. 2020y	01.01. 2019y	01.01. 2020y			
1	2	3	4	5	6	7	8
1 Coal	8	8	1	1	thousand tons	3	82231
2. Peat	14	14	1	1	thousand tons	0	23727
3. Kaolin	2	2	1	1	thousand tons	116,7	36964
4. Bentonite clay	1	1	1	1	thousand tons	0	48071,1
5. Refractory clay	1	1	0	0	thousand tons	0	45521
6. Cement raw materials	1*	1*	1*	1*	thousand tons	11,1	733,7
7. Sand	20+1*	20+1*	7+1*	7+1*	thousand m ³	217,31	22868,61
8. Facing stone grn	6	6	3	3	thousand m ³	4,14	13893,20
granite					thousand m ³	4,14	12375,20
labradorite					thousand m ³	0	883
Gabro					thousand m ³	0	635
9. Building sstone	35+2*	35+2*	12+2*	12+2*	thousand m ³	669,56	168155,56
stone gneiss					thousand m ³	4,2	11735,75
Gabro granite					thousand m ³	0	1488
labrodorite					thousand m ³	465,1	131733,41
migmatitis					thousand m ³	thousand m ³	1296
monzonite					thousand m ³	0	8741
migmatite					thousand m ³	200,36	10925,4
granite					thousand m ³	0	2031
10. Expanded clay raw materials	0	2	0	0	thousand m ³	0	3727
loam					thousand m ³	0	3727

1	2	3	4	5	6	7	8
11. Raw materials are brick and tile	106+1*	106+1*	22	17	thousand m ³	88,38	99951,08
clay					thousand m ³	11,2	1494,55
Marl clay					thousand m ³	12,1	1232,7
marl					thousand m ³	0	1094
sand					thousand m ³	0	314
loam					thousand m ³		95752,83
sand					thousand m ³		63
12. Apatite	1	1	1	1	thousand tons	0	77943,98
13. Raw materials	1*	1	1*	1	thousand tons	0	0
14. A mixture of sand and gravel	0	1*	0	1*	thousand m ³	0	32,4
15. Fresh water	73	74	44	42	thousand m ³ /day	20,044	330,964
16 Mineral waters	7	7	2	2	thousand m ³ /day	18,630	1337,0

Information provided by the State Service of Geology and Subsoil of Ukraine as of 01.01.2020

* - Objects of accounting, which are part of complex deposits

According to the State Service of Geology and Subsoil of Ukraine as of 01.01.2020 in the region explored and taken into account 74 deposits of fresh groundwater, of which 42 are being developed. Balance operational reserves of groundwater and technical water are 330,964 thousand m³ / day categories A + B + C1 (which is 2.17% of the reserves in Ukraine) and 3,600 thousand m³ / day - in category C2 (which is 0.38% of the reserves in Ukraine). The chemical composition of water is hydrocarbonate calcium-magnesium. Production of underground drinking and technical waters amounted to 28,044 thousand m³ / day, losses - 0,641 thousand m³ / day.

The total number of quarries, including those in development - 148 (of which 45 are active). Mineral deposits of national importance include:

1. Tanske and Pivnichno-Tanske deposits of facing stone (granite);
2. Starobaban deposit of facing stone (section "Wedge", section "Granite");
3. Horodyshche facing stone deposit (labradorite);
4. Novoselytske and Murzynske deposits of secondary kaolins;
5. Cherkasy deposit of bentonite clays (Dashukivska section);
6. Mokrokaligirskoe brown coal deposit.

Deposits of building stone, kaolin, brick and tile raw materials (loam, clay), bentonite clay and building sand are mainly developed.

Forest resources

Cherkasy region is located in the center of Ukraine and covers 20 administrative districts: Horodyshche, Drabiv, Zhashkiv, Zvenyhorod, Zolotonosha, Kamyansk, Kaniv, Katerynopil, Korsun-Shevchenkivsky, Lysyansky, Mankivsky, Monastyryshche, Smilyansky, Chernivtsi, Talnivsky Chyhyrynsky, Chornobaivsky, Shpolyansky. In the north the region borders with Kyiv, in the west - with

Vinnytsia, in the south - with Kirovohrad, in the southeast - with Poltava regions. Its area is 2091.6 thousand km² (3.4% of the total area of Ukraine). The forests of Cherkasy region by their ecological and socio-economic significance and location perform mainly protective, climatic, water protection, sanitary and health functions and have limited operational value. . They play a significant role in the development of the regional economy, improving the environment. Cherkasy region, having an area of 20.9 thousand hectares, belongs to the sparsely forested regions of Ukraine: the total area of the forest fund of the region - 338.6 thousand hectares, including forested - 322.4 thousand hectares, ie forest cover is 15.4 %, with optimal forest cover - 16% [1, 5, 6, 43].

This forest cover is optimal for our region. Only at this level, according to theoretical justifications, the forests of the region have the most positive effect on the climate, soil and water resources, reduce the effects of water erosion, provide more wood. After a significant increase in the impact of anthropogenic factors in the late eighteenth century, the area occupied by forests was rapidly reduced. Only since the 1950s, thanks to a professional, scientifically sound approach to logging and intensification of reforestation and afforestation work, the area of land covered with forest vegetation has increased by more than 60 thousand hectares. The current state and distribution of forests in the Cherkasy region is, first of all, the result of human activity. Forest plantations in Cherkasy region are mostly artificially created (over 70%) and the average age of forests is 62 years. The dynamics of forest cover in Cherkasy region has been growing since the region was established - since 1954, forest cover has increased by 4.1%. Forests in the region are unevenly distributed. They were most common in Cherkasy (37.8%), Kaniv (31.9%), Smilyansky (25.8%), Chyhyrynsky (23.2%), Korsun-Shevchenkivsky (21.6%) and Horodyshche (19. , 1%) administrative districts. The lowest percentage of forest cover is in Zhashkiv (2.5%), Drabiv (2.7%), Chornobayiv (4.8%), Khrystyniv (6.5%) districts. The forests of the region are dominated by fresh hornbeam and oak groves. A relatively narrow strip along the right bank of the Dnieper, including the Cherkasy Bir, is occupied by a forest-typological area of fresh hornbeam-pine subdrugs, where, in addition to the main type of forest, there are oak-pine stands, hornbeam groves, and raw black alder clumps. Typical forest-steppe landscapes - alternation of open spaces with forested

areas - give special attractiveness and originality of the territory of Cherkasy region.

The forests of Cherkasy region are formed by more than ten species of the main and accompanying forest-forming species, among which oak, pine, acacia, ash, hornbeam, and alder dominate. The share of hardwood plantations is 64.3%, coniferous - 28.8%, softwood - 6.3%. Cherkasy is one of the most famous steppe forests in our country. This is the largest island massif of pine forest in Ukraine, which naturally arose and has survived to this day on the southern border of the area of Scots pine. The area of pine is 28,488 hectares, which is almost 80% of the total area of Cherkasy Forestry, of which it is a part [51]. Cherkasy region also has a special monument of nature and history - a unique forest "Cold Yar", which has historical and environmental significance. The tract has an area of 6804 hectares and is located in two administrative districts of Cherkasy region - Chyhyryn and Kamyansky and two forestries of the State Enterprise "Kamyanske Forestry" - Kresheletsky and Hrushkivsky.

The forest fund of the Kholodny Yar tract is represented mainly by highly productive plantations of artificial origin. According to the number of unique archeological, historical, scientific objects, and there are more than 150 names, Kholodny Yar ranks first in Ukraine. Cherkasy region is also rich in trees - natural monuments. These are especially outstanding natural works that are protected in their original form, as they have scientific, cultural and aesthetic significance. Among them, in particular, Shevchenko's oak and Gogol's pine in the village of Prokhorivka, Maksym Zalizniak's oak near Buda hamlet and a number of others. The miracle of Cherkasy region is a combination of alder and common oak, which are fused with trunks and have a height of over 20 meters. Given the importance of tasks to protect the environment and improve the economic condition of the region, the forests of Cherkasy region have one of the leading places. [9,53,46, 55]

Aquatic resources

Characteristics of major rivers. On the territory of the region there are 1037 rivers and streams with a total length of 7.5 thousand km. Large rivers include the Dnieper (within the region - 150 km), medium rivers - Ros, Tyasmin, Gnily Tikich, Mountain Tikich, Supiy, Yatran, Velyka Vys. The other rivers are small: Vilshanka, Zolotonoshka, Irdyn, Irkliy, Umanka, Shpolka, Chumgak, Sinyukha, Udych. The territory of the region is part of the basins of the Dnieper and Southern Bug rivers, which belong to the Black Sea basin.

Water use in 2019 amounted to 149.7 million m³, including: for production needs - 82.79 million m³, household and drinking needs -

23.52 million m³, irrigation - 20.71 million m³, agricultural needs - 22, 63 million m³ (Fig. 2).

The largest artificial reservoirs within the region are Kanivske and Kremenchuk, formed by hydroelectric dams, in addition, 37 small reservoirs have been built and more than 2.3 thousand lakes, ponds and reservoirs. On the territory of the region there are 2984 ponds, with a total area of 17456 hectares, with a volume of 246.6 million m³.

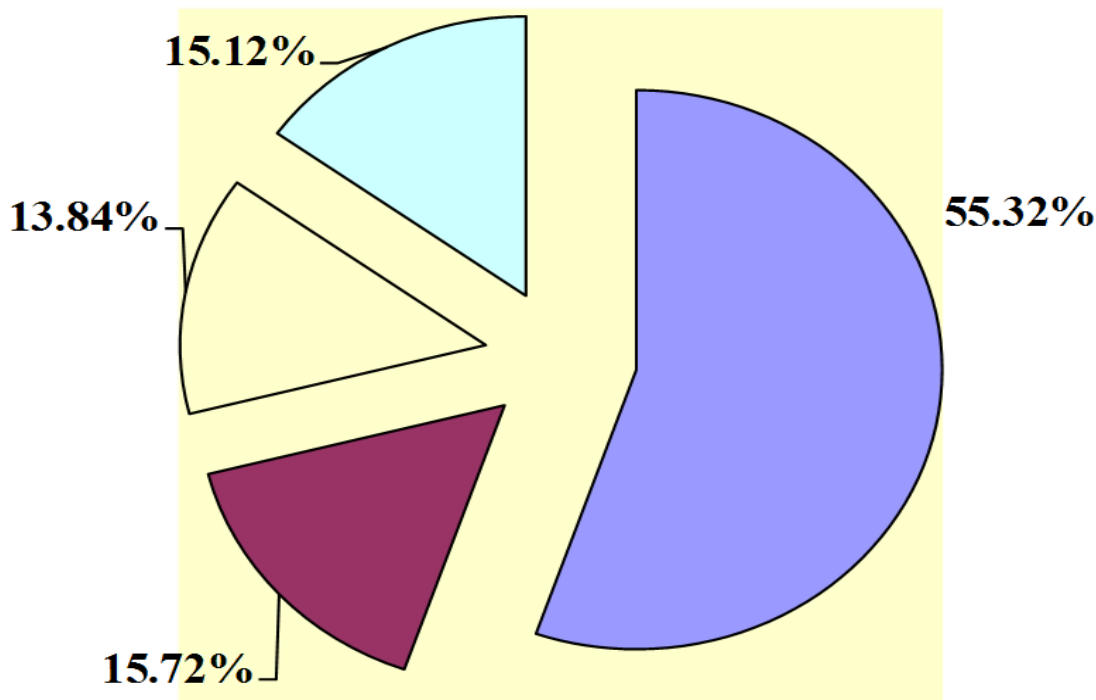


Fig. 2. Structure of water resources use, million m³

Input data to fig. 2

Production needs	82,79 million m ³	55,32 %
Household and drinking needs	23,52 million m ³	15,72 %
Irrigation	20,71 million m ³	13,84 %
Agricultural needs	22,63 million m ³	15,12 %

According to the Regional Office of Water Resources in Cherkasy region

On the Right Bank of Cherkasy region, flooding and waterlogging of some areas are possible.

The average long-term river runoff of the region is 1.01 km³ / year. Violation of winter conditions in recent years has affected the formation of ice on the water bodies of the region.

Below, we describe the main rivers of the region.

The Dnieper is the main artery of Ukraine. As far back as 400 BC, Herodotus called the Dnieper Borisphen, which in Greek means "flows from the north." For great influence on the fertility of the surrounding lands, the scientist equated it with the Nile.

The Dnieper is a typical flat river, its slope only in the upper reaches exceeds 50 cm / km, on average it is about 10 cm / km, near the estuary it decreases to 0.1 cm / km. Within Ukraine, the Dnieper flows in a wide floodplain covered with a significant thickness of alluvial deposits, represented mainly by multi-grained and easily moving quartz sands.

To the mouth of the Irpen floodplain of the Dnieper has low banks, its width in some places reaches 10-12 km. Between the mouths of Irpen and Samara, the Dnieper valley is asymmetric, its right bank is steep and rises 50-150 m above the water, and its left bank is lowland and sloping. There are stone ledges near Kremenchuk in the Dnieper riverbed.

Beginning in 1927, the construction of a cascade of powerful hydroelectric power plants and a number of large reservoirs began on the Dnieper. The largest among them is Kremenchug, which has an area of 225,000 hectares of water, length - 172 km, width - 15-26 km (construction 1954 - 1960). The largest width of the reservoir is near the confluence of the Sula River, the average depth is 6 m, near the dam it reaches 25 m. Water comes to it from the Dnieper and partly from its tributaries. After the creation of the Kremenchug Reservoir, the degree of waterlogging of the region increased due to flooding of the Dnieper floodplain and the lower part of the Sula Valley and other tributaries. The reservoir affects the formation of temperature and humidity, wind, cloudiness and precipitation of the surrounding area. Due to the consumption of heat for evaporation here in the summer there is a decrease in air temperature and increase its humidity. Replacing land with water increases wind speed. Reservoir waves cause gradual expansion.

The Dnieper basin covers 42% of rivers throughout Ukraine, collecting water from the Volyn, Podil and Prydniprovskia uplands, the Polissya and Prydniprovskia lowlands, and partly from the Central Russian upland and the Donetsk ridge. In the south, the Dnieper basin crosses the Black Sea lowlands. Before the construction of the HPP on the Dnieper, there were many islands and floodplains.

The length of the Dnieper is 2285 km, the area of the basin is 503 thousand km². According to hydrological and physical-geographical features, the Dnieper is divided into three parts - the upper (from the source to Kiev), the middle (from Kiev to Zaporozhye) and lower (from Zaporozhye to the mouth). Cherkasy region is located in the middle part.

Significant are the right tributaries of the Dnieper, flowing in the region - Ros, Tyasmin, and left - Supiy, Sula.

Ros 17-18 km below Kaniv flows into the Kremenchug reservoir. The length of Russia is 346 km, the area of the basin is 12,575 km². It takes place in Vinnytsia, Zhytomyr, Kyiv and Cherkasy regions. The main soil-forming rocks in the territory of the Rossi basin are forest, loam, hard weathering products, moraines and alluvial fluvio-glacial deposits. The

most common are sod-podzolic, sod-gley deep (meadow), gray podzolic, chernozem meadow soils. Wetlands and peatlands are less common. Complex geomorphological, hydrological, climatic and soil conditions of the river basin have influenced the formation of vegetation.

The flora of the Rossi Valley and its tributaries are distributed as follows: forest vegetation - 151 species, steppe - 163, meadow - 187, swamps - 52, water - 40, weeds - 59 [57]. A total of 652 plant species belonging to 83 families and 346 genera have been identified. Most of them - compositae, cereals, labiate, sedge, cruciferous, umbrella, lily, rosacea [37, 38].

The Supiy River begins in the Chernihiv region and flows into the Kremenchug Reservoir. Its length is 130 km, the area of the basin is 2000 km² (Fig. 3 - see the section "Illustrations").

Below Supa, the right tributary of the Vilshanka flows into the reservoir, which originates near the village of Pedynivka of Zvenigorod district. Its length is 106 km, the area of the basin is 1220 km². The Vilshanka basin is wooded (16%), sometimes swampy (see Fig. 4 in the "Illustrations" section).

The Sula River is a left tributary of the Dnieper. The length is 310 km, the area of the basin is 18.1 thousand km². The Sula flows on the territory of Sumy and Poltava regions, almost entirely on the Dnieper lowland in the Forest-Steppe zone, on the border of Cherkasy and Poltava regions.

The Tyasmin River is a right tributary of the Dnieper and flows into the Kremenchug Reservoir. The length is 194 km, the area of the basin, which is located on the Dnieper Upland, is 4730 km². Forests occupy about 15% of the area of the basin, in the upper reaches is the town of Kamyanka, then on both banks of the Tyasmin, on an elevated site, near the tributary of the Irdyn - the town of Smila.

Irdyn is a swampy left tributary of the Tyasmin with a length of 23 km and a basin area of 285 km², the width of the floodplain is 1500 m. Between Cherkasy and Chyhyryn lies the forest "Cold Yar".

Unlike the steep right, the left bank of the Tyasmin has many springs. It is covered with alder plantations, sloping and sandy.

The Southern Bug River has a length of 792 km, the area of the basin is 63,700 km², within which is the Sinyukha River, one of its main tributaries (length - 111 km, basin area 16,725 km²). Tikich flows into Sinyukha - a river formed by the confluence of the Mountain and Rotten Tikich.

Below Cherkasy, the Zolotonosha River, which is 92 km long and has a basin area of 1,260 km², flows into the reservoir from the left bank (see Fig. 5 in the "Illustrations" section).

Mountain Tikich has a length of 167 km, the area of the basin - 3525 km², which occupies the central part of the Dnieper Upland. The

shores of the Tikich Mountain are elevated, rocky, rocky and steep. The town of Talne is located on the Tikich Mountain. Rotten Tikich (length - 156 km, area of the basin - 3125 km²) merges with the Mountain Tikich, which has a slow current, a swampy bottom and the same shores. Lysyanka township, Zvenyhorodka town are located on the river.

The left tributary of the Sinyukha is Velyka Vis, which is 165 km long and has a basin area of 2,842 km². The border of Kirovohrad and Cherkasy regions runs along its lower and middle reaches.

One of the right tributaries of the Sinyukha is Yatran (length 107 km, area of the basin - 2170 km²). It originates on the Dnieper Upland near the village. Tomashivka of Uman district. The river is winding, sometimes rocky. Forests cover almost 5% of the basin area.

Yatran takes the left tributary of the Umanka (length - 43 km, basin area - 411 km²). Forests cover 6% of the river basin. The city of Uman is located on the elevated bank of the Uman River. There is a park-monument of landscape art of national and world importance "Sofiyivka", founded in 1796 - 1800.

The left tributary of the Southern Bug is the Sinitsa River, which begins in the Cherkasy region (its length is 79 km, the area of the basin is 765 km²).

River aquifers, runoff distribution and hydrological regime are significantly influenced by physical and geographical factors - topography, soils, lakes, forest cover, wetlands, as well as economic activity. In turn, the change in the hydrological regime of water bodies causes changes in the species diversity of vegetation and types of landscapes [5, 18, 34, 63,69].

Hydrobiological assessment of water quality and the state of hydro biocenoses

According to the Cherkasy Regional Center for Hydrometeorology, regular hydrobiological observations (by sections of bioindication and biotesting) were carried out on 5 water bodies (3 rivers - the rivers Ros, Vilshanka, Tyasmin and 2 reservoirs - Kanivske and Kremenchug). The obtained data on the state of hydrobiocenoses showed that the average values of the saprobity index in all water bodies were moderately polluted, 3rd class of water quality. In the phytoplankton of Russia (point Korsun-Shevchenkivsky) the grouping of planktonic cenoses was rich and diverse, 18-47 species were found. Phytoplankton and zooplankton were dominated by indicator organisms of moderately polluted waters. In April, the share of α -mesosaprobic algae-indicators of polluted water in both Korsun-Shevchenkivskiyi algae increased to 43.5% in the upper line, to 61% in the lower line, and water quality decreased during this period. In April, a sharp increase in the biomass of diatoms was observed in both wells, which caused a strong degree of "blooming" of water

(concentrations of algae cells are environmentally dangerous, this can cause secondary biological pollution and overfishing; algal biomass was 12.3 mg / dm³ , at the bottom - 14.2 mg / dm³). In July, there was a sharp, almost 10-fold increase in algal biomass on the lower target compared to the upper target (total biomass on the upper target was 5.4 mg / dm³, on the lower - 52.0 mg / dm³). During this period, in the area 3 km below the town of Korsun-Shevchenkivskiy there was an intensive pollution of water with 54 nutrients, there was a "hyper-blooming" of water (environmentally dangerous, toxic concentrations of algae). Zooplankton was rich in numbers and species, dominated by oligo-β and β-mesosaprobic branched crustaceans. There was a stable development of animal plankton. Macrozoobenthos was represented by a variety of mollusks, water beetles, bedbugs, larvae of dragonflies, volochokryltsya, day-old, dicotyledonous insects. The condition of the bottom groups was stable, the diversity of bottom groups was very high. No sharp changes in the ecological situation were observed, in April and July the water quality of macrozoobenthos corresponded to the 2nd class (pure water). In general, the state of the aquatic ecosystem in terms of hydrobiological indicators corresponded to the 3rd class of water quality (moderately polluted). According to the results of biotesting, the chronic toxic effect of water on the survival and fertility of the test object was not detected. Along the Vilshanka River (Mliiv village) the development of phytoplankton was stable, the state of algal coenoses was stable.

In phytoplankton, various diatoms, green, euglenoid, and pyrophytic algae were represented, and 34 species of algae belonging to 5 systematic groups were found. In July, there was a significant depletion of the species composition of phytoplankton (9 species) and a decrease in the quantitative characteristics of its development. In April, there was an increase in the biomass of diatoms, which caused the initial "blooming" of water. In zooplankton, the peak of development occurred in July - 31 species of invertebrates from 3 groups were identified. In April, organisms of moderately polluted waters dominated, in July - pure waters. Planktonic groups continued to be in a fairly stable state. In the macrozoobenthos, crustaceans, mollusks, worms, water bugs and beetles, larvae of diurnal insects, two-winged insects, and a total of 24 "groups" were found to determine the bioindication. The quality of macrozoobenthos water in April corresponded to the 3rd class (moderately polluted water), and in July the condition of bottom cenoses significantly improved, the general species richness of invertebrates increased (2nd class - pure water). In general, the state of the aquatic ecosystem in terms of hydrobiological indicators corresponded to the 3rd class of water quality (moderately polluted). According to the results of biotesting, the chronic toxic effect of water on the survival and fertility of the test object was not detected. Along the Tyasmin River (Velyka

Yablunivka village) the phytoplankton of the river was small, qualitatively poor but structured, the seasonal dynamics of its development was not traced. Diatoms dominated in spring and summer. In the spring, water quality deteriorated due to an increase in the number of α -mesosaprobic algae (up to 23.3%). In summer, an increase in the biomass of α - β -mesosaprobic diatoms was observed, which did not cause "blooming" of water. Stable development of phytoplankton. The development of the zooplankton group in April was quite low. The peak of quantitative and qualitative indicators of zooplankton development came in July. In July, 18 species and 5 systematic groups of invertebrates were identified in the zooplankton group. 55

The presence of branched crustaceans in the samples was a positive trend, but their share was lower than last year. The basis of planktonic groups were β -, oligo- β - and β -oligomesosaprobic organisms (indicators of clean, moderately polluted waters). According to the Shannon index, the development of planktonic groups was stable, their state was stable. The condition of bottom cenoses remained stable and prosperous, seasonal dynamics of development was traced. 36 "groups" were found to determine the bioindication, most of which were mollusks, water beetles and bedbugs, larvae of volochokrilts, day-old and two-winged insects. The quality of macrozoobenthos water in April corresponded to the 1st class (very pure water), and in July the 2nd quality class (pure water) was determined. In general, the 3rd class of water quality (moderately polluted). According to the results of biotesting, the chronic toxic effect of water on the survival and fertility of the test object was not detected. When comparing assessments of the saprobiological situation on water bodies by phytoplankton and zooplankton, it can be concluded that bioindication by phytoplankton gives more leveled results than by zooplankton, and shifts the assessment of the ecological status of the worst quality class. In the Kaniv Reservoir (Kaniv) the indicators of qualitative and quantitative development of phytoplankton were low, much lower than last year (6-8 species). Blue-green and diatoms β -mesosaprobic algae developed en masse. "Flowering" of waters above Kaniv was not observed.

Plant plankton was in a rather depressed state. The development of zooplankton in May corresponded to the seasonal dynamics, the samples were dominated by oligo- β -mesosaprobic rotifers, which are characteristic of clean, slightly polluted waters. In August, single zooplankton organisms were found in the samples, in October, branched crustaceans dominated (97%), and water quality improved (pure water). In general, the state of the aquatic ecosystem in terms of hydrobiological indicators corresponded to the 3rd class of water quality (moderately polluted). According to the results of biotesting in the field 0.5 km above Kaniv, the chronic toxic effect of water on the survival and fertility of the

test object was not detected. In Kremenchug (Kaniv, Cherkasy), the development of phytoplankton in May and August was fairly even in line with the targets, in contrast to last year. In May, α -mesosaprobic diatoms dominated. Their share in the area below the city of Kaniv was 96.4%, water quality corresponded to the 4th class (polluted water). In the areas of Cherkasy, the share of α -mesosaprobic diatoms in May ranges from 56.1 to 80.3%. "Flowering" of waters took place, as last year, in August in all parts of Cherkasy due to the increase in the biomass of β -mesosaprobic blue-green algae, a moderate degree of this process was determined. The species richness of phytoplankton in the Cherkasy area was low, but its condition was quite stable. The state of the aquatic ecosystem according to phytoplankton corresponded to the 3rd class of water quality (moderately polluted). 56 According to the results of biotesting in the field 0.5 km below Kaniv, the chronic toxic effect of water on the fertility of the test object was established in October.

The state of the plant world

Due to the fragmentary nature of scientific research today, there are no updated data on the diversity of flora and fauna of the region. According to preliminary estimates, the natural flora of vascular plants (excluding exotics) in the Cherkasy region has about 2 thousand species. The list, compiled on the basis of analysis of various sources, includes 334 species of vascular plants (17% of the flora of the region) that are endangered. Among them, 69 species are listed in the Red Book of Ukraine, 14 - in Annex I to the Berne Convention, 7 - are protected in Europe (European Red List), 3 - worldwide (IUCN).

Under the greatest threat were 29 species (category - 0), populations of most of them are now apparently extinct. Therefore, measures that include surveys of known habitats from the literature, development of a program for the preservation of their local populations, repatriation of the population of some of them to natural cenoses are appropriate. A significant number of species (84) belong to the 1st and 2nd categories and belong to the high-risk group. Therefore, it is important to create appropriate forms of protected areas in the territories and natural tracts where they grow. For the remaining 219 species (categories 3 and 4), the priority measure to ensure protection is to monitor the status of their populations.

Characteristics of plant species of Cherkasy region listed in the Red Book of Ukraine

Astragalus dasyanthus Pall. Legume family. Perennial herbaceous plant, 10-30 cm tall, unpaired leaves. Bright yellow flowers are collected in dense capitate racemes. Beans are hairy, ovoid or oval, about 1 cm long. It blooms in June and August. Balkan-Pannonian-Black Sea species [69].

Bulbocodium versicolor (Ker-Gawl.) Spreng. Lily family. Perennial herbaceous bulbous plant, 8 - 15 cm tall, with basal lanceolate-linear, grooved leaves that develop simultaneously with the flowers. The flowers are goblet-shaped, solitary, rarely two or three, the leaves are free, purple-pink. It blooms in March and April. It grows on steppe areas, grassy slopes, among sparse shrubs. South European-Caucasian species. Destroyed due to mass plucking on bouquets.

Euonymus nana L.Bieb. Shrub plant, 30 - 100 cm tall, with grooved branches and linear (1.5 to 3 cm long, leathery), bright green leaves on top, which do not fall off before winter. The flower is brownish-red, one, rarely - two or three in umbels on thin greenish peduncles. The fruit is a pear-shaped box, hanging, four-lobed, pale yellow or pink or greenish with an orange appendix. It blooms in May and June. Grows in oak forests, forest glades. Disappears due to deforestation, as well as due to lack of seed regeneration. The strictest protection of all known locations is necessary.

Cephalanthera damasonium (Mill.) Druce. The Zozulin family. Perennial herb, 20-60 cm tall, with an underground rhizome, erect stem and densely arranged ovate-elliptical leaves. Stem at the top naked. Yellowish-white flowers are collected in spike-shaped inflorescences. It blooms in May and June. Grows in deciduous and mixed forests, meadows, among shrubs. Destroyed as a result of plucking, as well as trampling, deforestation. General protection is needed

Cephalanthera rubra (L.) Rich. The Zozulynts family is a European-ancient Mediterranean species. One of the most beautiful orchids of our flora, which has inflorescences of large (up to 2 cm) purple-pink flowers. The plant is listed in Annex II to the Convention on International Trade in Endangered Species of Wild Fauna and Flora. It grows within the Cherkasy forest and Moshnogorsky ridge.

Daphne cneorum L. Thyme family. Low shrub, 10 - 40 cm tall, with ascending branches covered with gray-brown bark. The leaves are leathery, spatulate or oblong-ovate, evergreen. The flowers are tubular four-parted, pink, collected with heads at the ends of the branches. The fruit is a yellow-brown leathery stone. It blooms in May and June. Grows in pine forests. European-Mediterranean-Balkan-Asia Minor species with broken range, relict plant of the Tertiary period. Distributed on the Dnieper Upland, mainly in the Cherkasy forest.

Botrychium lunaria (L.) Sw. Family snake. Perennial fern plant, 10 - 30 cm tall, original appearance, one leaf of which is divided into two parts - vegetative (or sterile) in the form of a pinnate leaf with crescent or rhombic particles and spore-bearing - in the form of a bunch. Sporadic in June and August. It grows in deciduous and mixed forests, on grassy moist meadows and slopes. Eurasian-American-Australian species with

a torn range, a relict plant, a valuable species for science. Disappears due to deforestation and harvesting by the population as medicinal raw materials. General protection is needed.

Neottia nidus-avis (L.) Rich. Family Zozulin. Eurosibirsk view on the south-eastern border of the continuous range. Perennial herbaceous saprophytic rhizome plant. It occurs in the deciduous forests of Moshnohir and singly in the Cherkasy forest. Protected in the Moshnogorsk complex reserve. The number of species decreases due to plucking.

Liparis loeselii (L.) Rich. The Zozulin family. Perennial herbaceous plant, 20-40 cm tall, with two tubers at the base of the stem (new and last year's). The three lower leaves are underdeveloped, the other two are fully developed at the base of the stem, they are elongated-lanceolate, almost opposite. The flowers are yellowish-green, gathered in a sparse raceme. It blooms in June and July. Grows on peat bogs and swampy meadows. European-West Siberian-North American species. A rare endangered plant, distributed mainly in the Irdyn marsh. Disappears due to drainage of swamps.

Orchis palustris (L.) Jack. The Zozulin family. European-Mediterranean-pre-Asian species on the northern border of the range. Perennial herb. Occurs within the Irdyn marsh.

Orchis ustulata L. The Zozulin family. Perennial herb 10 - 40 cm tall. Leaves oblong-lanceolate. The flowers are very small, only up to 4 mm in size. The lip of the flowers is pink, spotted, and the helmet is black and purple. It blooms in June and July. It grows in meadows, meadows, among shrubs, on grassy slopes. European-Balkan-Caucasian species. Occurs in the forest-steppe part of the region. Disappears due to harvesting tubers, destruction of vegetation. Requires general protection.

Orchis nervulosa Sacalo. Leaves narrowly lanceolate, very finely toothed on the edge. The flowers are dirty-brown-purple, have a pleasant vanilla scent, all the leaves of the perianth in the flower are collected by a helmet, the lip is trilobate, with a long middle blade. Inflorescence many-flowered. It blooms in May and June. Grows on floodplain meadows. Protected in the Kaniv Reserve.

Orchis morio L. The Zozulin family. Perennial herb, 20-30 cm tall. Leaves oblong-lanceolate or linear-oblong, clustered at the base of the stem. The flowers are dark purple-purple, the lip is shallow-trilobate, the inflorescence is sparse, few-flowered. It blooms in May and June. It grows on grassy slopes in hollows, forest glades, edges. Disappears due to plucking, digging tubers, overgrazing and mowing grass. Necessary protection in places of growth

Listera ovata (L.) R. Br. The Zozulin family. Perennial herbaceous plant, 20 - 45 cm tall with underground rhizome. Stem with only two elliptical-ovate or oblong leaves. The flowers are greenish-yellowish, the

lip is cut almost to the middle into two oblong blunt blades, the inflorescence is a multi-flowered raceme. It blooms in moist shady forests, on moist forest glades, among shrubs. Euro-west Asian species. Occurs in the forest-steppe part of the region, absent in the steppe.

A pinch of Staphylea pinnata L. The rag family. Branched shrub or low tree, 1 - 5 m tall, has complex leaves (5 - 7 leaves), which are dark green above and lighter below. Inflorescence long sparsely branched, drooping panicle, white flowers. The fruits are original, very swollen, membranous, broadly inverted ovoid drooping boxes, inside which contains one - two large spherical seeds. It blooms in May and June. It grows in deciduous forests, on the edges, among shrubs, on rocky sunny slopes. Destroyed by felling shrubs. It is necessary to organize local reserves to protect this plant.

Stipa capillata L. Thin-legged family. Perennial herbaceous plant, 30-90 cm tall. Leaves narrowly linear, curled, glabrous on the outside, smooth or rough, pubescent inside. Inflorescence - narrow compressed panicle, 12 - 15 cm long. It blooms in June and July. It grows on steppe areas, rocky places, slopes, among steppe shrubs. European-Asian species. Disappears due to the destruction of remnants of steppe vegetation. Protected in the Kaniv Reserve.

Stipa borysthenica Klok. Ex. Prokud. Thin-legged family. Perennial herbaceous dense turf grass bluish-green plant, 25 - 75 cm tall. Inflorescence 18-30 cm long, the apex of the lower flower scales whitish, 25-35 cm long. It blooms in April and June. Grows on river sands, sandy soils in the grassy sandy steppe. South European-South Siberian-Central Asian species. It is necessary to organize reserves to protect this species.

Stipa dasyphylla (Czern.Ex. Lindem.Trautv). 5 mm wide, hairy, inflorescences 13 - 20 cm long, white feathers 30 - 40 cm long, blooms in May - June, grows on steppe areas, slopes, among shrubs, on the edges and meadows of riparian forests, distributed mainly on the Left Bank.

Stipa ioannis Hel. Thin-legged family. Perennial herbaceous grassy bright green plant, 40 - 65 cm tall. The leaves are flat or longitudinally folded, 0.5 - 1 mm wide. Inflorescence 10 - 20, white pinnate, 28 - 40 cm long. It blooms in May and June. It grows on steppe areas, slopes, rocky places, dry sunny edges, meadows, among steppe shrubs. European-Asian species. Disappears due to the destruction of remnants of steppe vegetation.

Corallorhiza trifida Chatel. The Zozulin family. Perennial herbaceous saprophytic plant, 10-25 cm tall, with a coral-like branched rhizome and a greenish-whitish stem, leafless, covered with scaly sheaths. The flowers are small, greenish, gathered in a liquid raceme. It blooms from June to July. Grows in shady, mostly deciduous forests, on

moist meadows. Disappears due to deforestation and replacement of natural forests with artificial plantations. It is necessary to create reserves for protection.

Epipactis palustris (L.) Crantz. The Zozulin family. Perennial herb, 20-60 cm tall with creeping rhizome. Leaves oblong or lanceolate acute, erect, densely leafy stem. The flowers are white-pinkish-yellow, drooping, on twisted peduncles, the ovary is purple, the lip of the flower is longer than the outer leaves of the perianth, it is two-membered. The anterior joint is broadly oval, the joint is movable. The inflorescence is not very dense. It blooms from May to July. Disappears due to reclamation works, drainage of swamps.

Epipactis helleborine (L.) Crantz. The Zozulin family. Perennial herb, 30 - 80 cm tall, with a shortened rhizome. Stem Leaves 5 - 10 cm long and 3 - 5.5 cm wide, longer than the internodes, lower - ovate, upper - lanceolate. The flowers are drooping, greenish-pink, the front part of the lip with a bent top and two smooth bumps at the base, connected fixedly. The inflorescence is quite dense. It blooms in July and August. Grows in deciduous and mixed forests.

Epipactis atrorubens (Hoffm. Ex. Bernb). Cuckoo family. Eurasian species. Individual plants with branched inflorescences can be the basis for breeding cultivated ornamental varieties. Perennial herbaceous rhizome plant. The population is declining due to deforestation.

Platanthera bifolia (L.) Rich. Cuckoo family Paleoarctic forest species. Perennial herb, the number of which is small and declining. It grows within the Moshnogorsk ridge. The number decreases as a result of economic activity - logging.

Platanthera chloranta (Cust) Reichenb. Family Zozulin European-Asian species. Perennial herb. The population of the species in the park is small, located sporadically within the Moshnogorsk ridge. The number within these limits is stable.

L. Schlechter). The Zozulin family. Perennial herb, 10-30 cm tall with solid round tubers. The two lower leaves are close at the base of the stem, almost opposite, oblong-elliptical, the upper leaves are much smaller and narrower. The flowers are pale purple-pink, gathered in racemes. The lip of the flower is three-lobed, the middle blade is tongue-shaped, the lateral ones are narrow-linear. It blooms in July and August. Grows in pine and mixed pine-deciduous forests. European-Asian species. Rare endangered plant. Disappears due to deforestation.

Dactylorhiza majalis (Redichenb). Cuckoo family. Perennial herbaceous plant, 15-60 cm tall, with lobed tubers. Leaves oblong-ovate to lanceolate with brown spots. Purple-purple flowers. lip - shallowly three-lobed, spotted, inflorescence - dense, cylindrical, blooms in June and July, grows in moist meadows, edges, meadows, Euro-Mediterranean species, disappears due to drainage and digging of tubers. of this species.

Galanthus nivalis L. Amaryllis family. Perennial herb, 8 - 15 cm tall, with an underground bulb. Two linear dark green bluish leaves. Stem cylindrical, with one drooping flower protruding from the axils of the membranous lanceolate bract. The flower is white, the perianth consists of six leaves: three outer large (15 - 20 mm long) and three inner (twice smaller). The wedge-shaped inner leaves of the perianth have a characteristic green border. It blooms in March and April. It grows in deciduous and mixed forests among shrubs, in places en masse. European-Balkan-pre-Caucasian medium-common species. As a result of the annual plucking of flowers, the flowers are gradually destroyed. Many places have already disappeared, especially near large cities. It is necessary to monitor compliance with the ban on the sale of bouquets and protection of locations.

Lucopodium annotipum L. Plaun family. Perennial herb 10-30 cm tall. The stem is densely covered with linear-lanceolate, hardy, with a prickly tip, horizontally or backwardly bent leaves. Spore-bearing spikelets solitary, sitting at the ends of branches. Sporadic species in August and September. Grows in moist forests, mostly coniferous. European-Asian-North American (holarctic) species. The number is declining due to deforestation.

Drosera anglica Huds. The sundew family. Perennial herbaceous insectivorous plant, 10 - 25 cm tall, with a leafless flower stalk. The leaves are in the rosette, they are directed upwards, linear-wedge-shaped, gradually turning into a petiole. The leaf blade is covered with glandular hairs on top and on the edges. The flower arrow is twice as high as the leaves. The flowers are white, in an elongated inflorescence. It blooms in July and August. Grows on sphagnum bogs, peatlands. Holarctic view. Disappears due to drainage of swamps and reclamation works.

Salvinia natans (L.) All. Salvinian family. Fern aquatic floating annual plant, 8-20 cm in size, devoid of roots. Stem filamentous, branched. The leaves are arranged in rings of three, two of them - floating, oblong or oval, the third is immersed in water, repeatedly dissected, making it resemble roots. Plants are spores, sporocarps (containers of sporangia with spores) spherical, closed. Sporadic in August and September. Grows in slow-moving and standing waters. Holarctic species valuable for science. Disappears due to water pollution. Constant monitoring of the state of local populations is needed.

Scopolia carniolica Jacq. Solanaceae family. Perennial herbaceous plant, 20-65 cm tall, with thick horizontal branched rhizomes and branched stems. The leaves are large elliptical, slightly toothed in front, narrowed at the base into a winged petiole. The flowers hang on the legs, solitary, the corolla is tubular-bell-shaped with a five-toothed limb. Outside brown-reddish, in the middle - yellowish. The fruit is a two-

nested spherical box. It blooms in May and June. Grows in deciduous forests. Central European species.

Pulsatilla grandis **Wend.** Buttercup family. Perennial herb, 10 - 20 cm tall, with a short rhizome, during flowering densely protruding-yellowish-fluffy. The leaves are pinnately dissected three times, later they open completely. Perianth leaves are light purple, outside - silky-hairy. It blooms in April and May. It grows on meadow-steppe slopes, sunny edges, meadows, among shrubs. Central European species. Rare endangered plant. Destroyed by mass plucking on bouquets.

Gentiana cruciata **L.** Yarrow family. Perennial herb, 15-30 cm tall. Leaves oblong-lanceolate, with blunt ends. The flowers are four-membered, in axillary and apical rings, sessile. Calyx membranous, with uneven linear-lanceolate lobes. Corolla 2 - 2.5 cm long, club-shaped, with ovoid blades, gray-green outside, blue inside. It blooms in July and August. Necessary control over the state of populations, the organization of reserves.

Hammarbya paludosa **(L.) O. Kuntze.** Zozulin family. Perennial herbaceous plant, 6 - 20 cm tall, with a small rhizome. Three or four leaves are located at the bottom of the stem, they are ovate or oblong. The flowers are small, yellowish-green, gathered in a raceme, the lip of the flower is upside down, whole, the ovary on a twisted peduncle. It blooms in July and August. Grows on peat bogs. European-Siberian species. Rare endangered plant. Disappears due to drainage of swamps.

Equisetum majus **Gars.** Horsetail family. Perennial herbaceous spore plant, 30 - 100 cm tall, with rhizomes and individual spore-bearing and vegetative stems. Spore-bearing stems - thick yellowish-white, with close funnel-shaped sheaths, with 20 - 30 brown teeth, ending in a hairy tip. Sterile stems are pale green, branched, their vaginas are cylindrical, with teeth whose length is equal to the length of the vaginal tube, green branches 4 - 5-faceted. Sporades in April and May. Disappears as a result of drainage of wetlands, excessive grazing of animals, trampling, etc.

Allium ursinum **L.** The lily family. Perennial herbaceous plant, 15 - 50 cm tall, with a whitish cylindrical-elongated bulb. The leaves are basal, long-petiolate, their broadly elliptical plate resembles lily of the valley leaves. Flower arrow - triangular, with a top in the form of a simple umbrella of white star six-petalled flowers. It blooms in May. Grows in shady deciduous and sometimes mixed forests. Protected in some forest tracts. Requires constant monitoring of the state of populations.

Lathyrus venetus **(Mill) Wohlf.** The legume family. Perennial herb, 20-40 cm tall, with a branched stem from the base. The leaves are compound pinnate, broadly oval leaves with a short tip and several main veins. The flowers are pale purple, 10–13 mm long, gathered in 25-flowered racemes. It blooms in May and June. Grows in shady deciduous forests, on the edges of meadows. Needs universal protection. Protected in the Kaniv Reserve [11, 56, 59, 69].

Chapter 2 REGIONAL BIODIVERSITY

General characteristics

Preservation of biological and landscape diversity is important for achieving sustainable development and plays a significant role for all spheres of human activity (economic, social, environmental), determining the culture, spirituality and mentality of society. This is a multifaceted process that involves legislative, scientific and methodological, socio-economic support of programs and activities in this area.

One of the promising areas of implementation of the strategy of bio- and landscape diversity is related to the development of the ecological network. The formation of the ecological network involves changes in the structure of the land fund of the region by assigning (based on environmental justification (safety) and economic feasibility) part of the land for economic use to categories subject to special protection with the restoration of their inherent diversity of natural landscapes. This is in fact a nationwide mechanism for achieving the harmonious coexistence of society and nature in its territorial and biotic diversity [31, 33].

The regional eco-network of the region corresponds to the basic landscape principles and is a component of the national eco-network.

To ensure the effective functioning of the geospatial model of the regional eco-network, the optimal number of structural elements of the eco-network is identified, namely 25 landscape eco-cores of different hierarchical levels (6 of them - national, 8 - regional, 13 - local); 38 eco-corridors (2 of them are Pan-European, 3 are regional, 32 are local and their buffer zones). It should be noted that the natural complexes under protection within the territories of the nature reserve fund are the most protected (Table 3).

3. Areas of land - components of the national ecological network over the years, thousand hectares

Categories of land use	Years				
	2015	2016	2017	2018	2019
Natural lands (NWF), thousand hectares	63,117	63,940	64,041	64,151	64,630
Hayfields and pastures, thousand hectares	143,2	143,2	143,2	143,2	143,2
Land for water management (fish ponds), thousand hectares	12,9	12,9	12,9	12,9	12,9
Water fund lands, thousand hectares	166,3	166,2	166,2	166,2	166,2
Health-improving lands, thousand hectares	0,2	0,2	0,2	0,2	0,2
Recreational lands, thousand hectares	0,1	0,1	0,1	0,1	0,1
Lands of historical and cultural purpose, thousand hectares	0,6	0,6	0,6	0,6	0,6
Forests, thousand hectares	338,6	338,6	338,6	338,6	338,6

According to the Main Department of the State Geocadastré in Cherkasy region

The negative impact of anthropogenic factors on the environment is still quite intense, among the main causes of biodiversity depletion are: - environmental pollution (emissions of surface and groundwater pollution); - denaturalization of natural landscapes (soil and air erosion, flooding of territories, distribution of agrolandscapes, uneven development of the territory); - monocultural methods of forestry and agriculture. The main factors that can affect the number of plants with "red book" status are plucking and degradation of habitats (for meadow and swamp species - excessive grazing, mowing, grass burning, drainage; for forest - forestry). The components of the structural elements of the ecological network are shown in table 4.

4. Components of structural elements of the ecological network

Unit of administrative-territorial organization	Total area, thousand hectares	The total area of the ecological network, thousand hectares	Area, thousand hectares *									
			NPF objects **	Wetlands	Open wetlands	Water protection zones made in nature	coastal-forest strip	Forests and other wooded areas	Resort and health areas	Recreational areas	Open lands without vegetation or with little vegetation	Pastures, hayfields іножати
Черкаська область	2091,6	776,2	64,0	135,7	30,45	0,59	46,6	338,6	0,16	1,5	15,45	143,1

Note (to Table 4): * according to the Main Department of the State Geocadastre in Cherkasy region; ** nature reserve fund.

Threats to the forest vegetation of the region are: burning of dry vegetation in the spring, which leads to forest fires; deterioration of wood harvesting and skidding technology; drying of pine forests; unauthorized felling. Significant losses of the gene pool of rare species of medicinal and ornamental plants are caused by uncontrolled exploitation of their resources. Poaching is one of the reasons for the decline in the population of game animals and birds. One of the methods of minimizing current threats to biodiversity is the introduction of environmental impact assessment, including biodiversity and reducing their level. The following measures will allow to implement this method: - improvement of legal support on biodiversity impact assessment; - development of methodological materials on environmental expertise, strategic environmental assessment, environmental audit, ecosystem approach and the principle of prevention; - improvement of legal support, in terms of taking into account the issues of biodiversity conservation during management decisions.

Flora of the region.

In terms of landscape zoning, Cherkasy region belongs to the plains of Eastern European forest-steppe landscapes, the most extensive of which are forest-steppe upland dismembered, forest-steppe dismembered and terraced.

Tree vegetation.

Cherkasy region, having an area of 20.9 thousand hectares, belongs to the sparsely forested regions of Ukraine: the total area of the forest fund of the region - 338.6 thousand hectares, including forested - 318.33 thousand hectares, ie forest cover is 15.4 %, with optimal forest cover - 16%. The distribution of forestry lands is presented in table 5.

5. Characteristics of forestry lands

Forestry lands	Unit of measurement	Quantity
Total area of forestry lands	thousand hectares	338,6
including:		
state forestry enterprises	thousand hectares	271,50
communal forestry enterprises		
forest owners	thousand hectares	67,14
not provided for use (stock lands)		
Area of forestry land covered with forest vegetation	thousand hectares	318,33
Forest cover (ratio of forested area to total area of the region)	%	15,4

the information was provided by the Main Department of the State Geocadastr in Cherkasy region, Cherkasy region Department of Forestry and Hunting.

The forests of the region are dominated by fresh hornbeam and oak groves. A relatively narrow strip along the right bank of the Dnieper, including the Cherkasy Bir, is occupied by a forest-typological area of fresh hornbeam-pine subdrugs, where, in addition to the main type of forest, there are oak-pine stands, hornbeam groves, and raw black alder clumps. Typical forest-steppe landscapes - alternation of open spaces with forested areas - give special attractiveness and originality of the territory of Cherkasy region. Forests of Cherkasy region are formed by more than ten species of main and accompanying forest-forming species, among which oak, pine, acacia, ash, hornbeam, alder dominate. The share of hardwood plantations - 64.3%, coniferous - 28.8%, softwood - 6,9% (Fig. 3).

The largest area (64,3%) is occupied by common oak (*Quercus robur* L.). In addition to the common oak, the red oak (*Quercus rubra* L.), which has a large-sawed edge of the leaf blade and relatively fast growth, has become widespread in forests and especially parks. Such oaks look especially decorative in autumn, having crimson leaves of all shades. Originating this oak from North America, but well established in Ukraine.

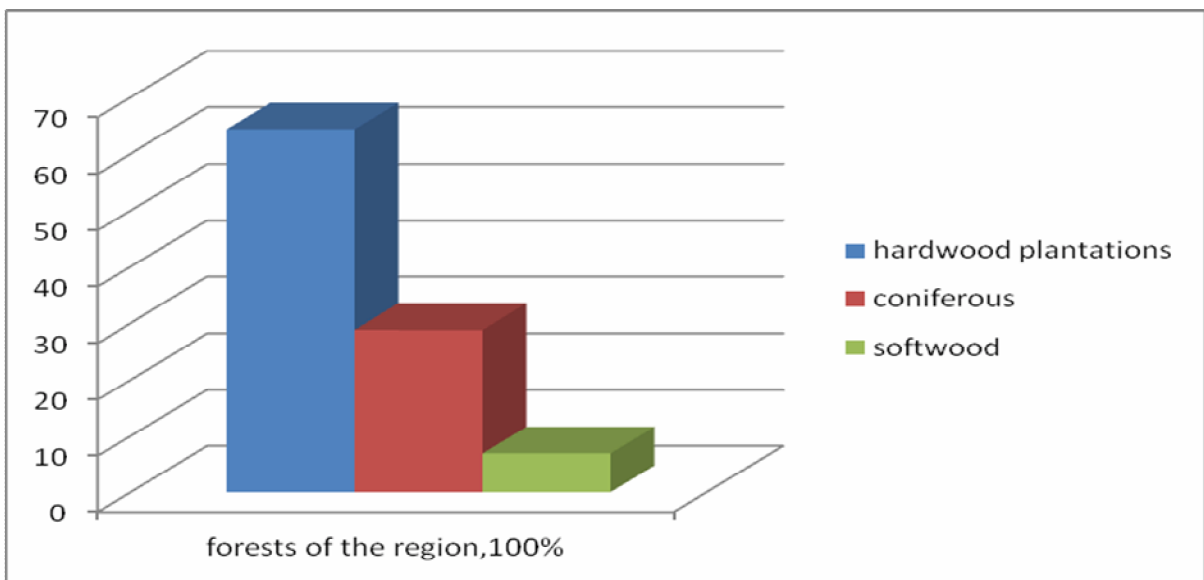


Fig. 3. Distribution of forest area by predominant tree species

The second most valuable deciduous tree species in the forests of Cherkasy region is common ash (*Fraxinus excelsior* L.), but it is significantly inferior to the area of common oak.

Hornbeam (*Carpinus betulus* L.) is also distributed in almost the same amount as ash in the forests of Cherkasy region. Being a shade-tolerant tree, hornbeam feels good in the forest under the canopy of oak, linden and maple trees. It very rarely forms pure stands in the forest, occurring in the second tier of deciduous plantations, in the conditions of lumpy and lumpy types of habitat growth [52].

Warty or drooping birch (*Betula pendula* Roth.) - a fairly common forest species in the northern and western regions of Ukraine. In the Cherkasy region, birch coppice is found to a lesser extent than other deciduous species. Most often, it is an impurity in the stands of almost all types of forests, occasionally creating clean plantations.

Birch light-loving wood species. It forms a light stand, so it is popularly called a rainbow. Although birch is warty and loves fresh fertile soils, it tolerates dry air, it can often be found in fresh pine forest.

Fluffy birch (*Betula pubescens* Ehrh.) More shade-tolerant. In the people it is often called black, because of the color of the bark.

Birch is widely used in ornamental horticulture, creating picturesque alleys and landscape groups. Warty birch is especially well combined in landscape groups with blue trees, white weeping willows and rowan.

Acer platanoides L. is considered to be the most common companion of oak in forests.

In the Cherkasy region, in addition to the naturally distributed black poplar (*Populus nigra* L.) and white (*P. alba* L.) poplars, there are other

species of more ornamental poplars, including Canadian (*P. deltoides* Maisch.), Chinese (*P. simonii* Carr. .), pyramidal (*P. pyramidalis* Rozier.).

Among the tree species in the forests of the region after the oak (48.7%) the second place is taken by (32.5%) Scots pine (*Pinus sylvestris* L.), a representative of the oldest seed plants of our planet. Scots pine is found throughout the region, but its main massifs are concentrated in the Dnieper region in the Cherkasy forest, in the Cherkasy administrative district. By the way, 35% of the state forest fund in Ukraine is pine (see Annex 4).

Weymouth pine (*P. strobus* L.) is quite common in the region.

Such wild fruit trees as walnut, wild pear, hazel, cherry, apple, mountain ash have become widespread in the forests of Cherkasy region.

Shrubs. In the forests of Cherkasy region among the known shrubs common hazel (*Corylus avellana* L.). Hazel can be found both in mixed forests and in those where oak or hornbeam grows. Hazel often creates dense thickets under the canopy of the forest, although it is often found in single bushes.

Viburnum opulus L likes to grow under the cover of deciduous and mixed forests in conditions with a significant amount of moisture, as well as on the banks of rivers and reservoirs.

The botanical name of this plant is from the honeysuckle family "*Viburnum opulus*". The first word comes from the Latin "viere" - to weave, knit, because its young branches are suitable for weaving baskets. The second word "opulus" is the Roman name for sharp-leaved maple, because the leaves of viburnum look like maple.

The Russian and Ukrainian names of the plant "viburnum" are probably related to the bright red color of its ripe fruits, which have a "hot" (hot) color.

Viburnum - a tall (2-4 m) shrub. In spring, viburnum enchants with fragrant white flowers, and in late autumn with bright red fruits (drupes).

In the parks of the region and forest plantations there is still a viburnum, *V. Gordana* L. It has pubescent leaves and shoots, simple leaves, black fruits. It is used mainly in protective forest plantations as a bush plant.

Of the shrubs belonging to the honeysuckle family, the following three species of elderberry are still found in our forests: black (*Sambucus nigra* L.), red (*S. racemosa* L.), and herbaceous (*S. ebulus* L.).

Sea buckthorn bush (*Hyppophae rhamnoides* L) is widespread in artificial forest plantations, especially anti-erosion ones, on the edges of forests and groves and in forest belts in Cherkasy region.

Alice (*Primus divaricata* Leb.). The plant is common in forests, afforestation and gardens.

On the edges of forests, near precipices, on steep slopes you can find an unpretentious bush of thorny thorn (*Prunus spinosa* L.).

A fairly common shrub on the edges, in roadside plantations, on slopes, ditches and abysses - dog rose (*Rosa canina* L.).

European cowberry (*E. europea* L.) is still found in the forests of the region. This is a low shrub with quadrangular smooth (no warts) green shoots. Warty cowberry is much less common.

In the undergrowth of coniferous and mixed forests, on relatively rich soils there is a laxative (*Rhamnus catarica* L.).

Barberry (*Berberis vulgaris* L.) is found in coniferous plantations, parks and rocky slopes.

In forest plantations, especially oak groves, parks and hedges around gardens, there are different species of hawthorn, most often prickly hawthorn (*Crataegus oxyacantha* L.), Ukrainian (*C. ucrainica* A. Pojark.) And others.

Herbaceous forest plants. According to the scientific classification of forest vegetation conditions E.V. Alekseeva – P.S. Pogrebnyaka in dry forests (A_1), where there are pine forests with poor sandy soils and hilly terrain, the grass cover is liquefied. It is dominated by unpretentious species in terms of soil fertility and moisture: sheep fescue (*Festuca ovina* L.), celeriac (*Koeleria glauca* L.), grayish fescue (*Corynephorus canescens* (L.) Beauv.), Sand carnation (*Dianthus arenarius* L.), marten (*Calamagrostis epigeios* (L.) Roth.), sandpiper (*Arenaria stenophylla* Zedeb.).

Fresh pines (A_2). Pine forests with their flat and slightly undulating relief. The grass cover is represented by: thyme (*Thymus serpyllum* L.) and Dnieper (*Th. borysthenicus* Klok.), Hairy wind (*Hieracium pilosella* L.), sand cumin (*Helichrysum arenarium* (L.) DC.), Evening primrose (*Onagra biennis* (L.) Scop.), cane (*C. arundinacea* (L.) Roth.) and green moss cover.

Wet forests (A_3) occupy low-lying plains. In addition to green mosses, the grass cover contains: compressed fescue (*Nardus stricta* L.), dog's broom (*Agrostis canina* L.) and willowherb (*Zysimachia vulgaris* L.).

Raw forests (A_4), occupying places with a flat surface and high standing groundwater (at a depth of 0.5-1 m), are characterized mainly by cover with bushes and mosses, as well as liquefied grass of the vaginal down (*Eriophorum vaginatum* L.), meadow comfrey (*Succisa pratensis* Moench.), black-eared sedge (*Carex melanostachya*), leeks (*Juncus leersii* Marss.).

Subors are pine forests on poor soils, but in comparison with forests they are characterized by a higher content of nutrients (sandy soils). This trophotope has a much larger number of herbaceous plants. And besides, they were covered with a thicker.

Wet forests (B₃) are also rich in a variety of herbaceous plants. There are: erect foxglove (*Potentilla erecta* (L.) Raeusch.), Round-leaved pear (*Pyrola rotundifolia* L.), spring-leaved (*Majanthemum bifolium* (L.) F.W.Schmidt.), single European (*Trientalis europea* L.), incense (*Melittis melissophyllum* L). Characteristically, these species do not create a significant area of the jacket, the main background consists of green moss. As in the previous type of forest vegetation conditions, the fern, the common eagle, is becoming more widespread here.

In raw sub-forests (C₄) there are forest sedge (*Carex sylvatica* L.), dog's broom (*Agrostis canina* L.), creeping buttercup (*Ranunculus repens* L.), knotweed (*Filipendula ulmaria* (L.) Maxim.).

Wet oaks (D₃) have more liquefied grass. There are: dioecious nettle (*Urtica dioica* L.), perennial coppice (*Marcurialis perennis* L.), river gravity (*Geum rivale* L.), common circa (*Cirsaea lutetiana* L.), garlic petiole (*Alliaria officinalis* Andr.).

The number of species of vascular plants, algae, fungi and lichens at risk are presented in table 6.

6. Number of endangered species of vascular plants, algae, fungi and lichens

Species name	Number of species	Year						
		2013	2014	2015	2016	2017	2018	2019
Vascular plants	87	87	87	87	87	87	87	87
Mushrooms	9	9	9	9	9	9	9	9
Algae	-	--	--	--	--	--	--	--
Lichens	-	--	--	--	--	--	--	--
Together:	96	96	96	96	96	96	96	96

The following plants predominate in the stands of raw oak (D₄): creeping buttercup (*Ranunculus repens* L.), aster (*Stellaria nemorum* L.), sweet and bitter nightshade (*Solanum dulcamara* L.), meadow perch (*Cardamine pratensis* L.), weakling water (*Myosoton aquaticum* (L.) Moench.).

Almost the entire Irдин floodplain, 1.5-2 km wide, is overgrown with forest, in which the swamp alternates with meadows and lakes. Oak groves rose in the higher places, and in the lower places - oak-chernovilshannyky with undergrowth of rowan and cherry.

Although it is undeniably known that the forest in Cherkasy Forest, along with intensive felling, began to be restored by sowing and planting in 1832, now there are very few old trees that are many years old. There are only a few aged pines and oaks. So, in Rusko-Polyansky forestry, in particular, the pedunculate oak 450 years old which reaches height of 24 m with a trunk diameter of 1,7 m grows. The average age of pine plantations here now fluctuates somewhere within 47 years, oak - 59, others. wood species - 33 years, which is only half of the age when the forest is suitable for industrial logging [7, 8, 10].

Fauna of the region

Analyzing the species composition and dynamics of the fauna, the following conclusion can be made: terrestrial macrofauna is 57 species [7], ichthyofauna for reservoirs (Kremenchug and Kaniv) in terms of Cherkasy region 51 species [2], avifauna - 246 species [19, 20, 21, 22], mammals of 68 species [12].

Ichthyofauna and fish resources of the region.

Fisheries in Cherkasy region have significant potential: 1,037 rivers, 2,314 ponds and small reservoirs of local importance. Within 5 districts of the region there is Kremenchuk Reservoir, the total area of which is 225 thousand hectares [10, 39]. The ichthyofauna of Kremenchuk Reservoir includes 51 species and subspecies of fish, and Kaniv - 48. The list of ichthyofauna of Kremenchuk and Kaniv Reservoirs is given in 7.

Table 7. List of species and subspecies of fish in the reservoirs of the Dnieper (V. R. Aleksienko, 2007)

Species and subspecies of fish	Reservoirs	
	1	2
1	2	3
Family - Petromyzontidae:		
<i>Eudontomyzon marinae</i> Berg	+	+
Family Acipenseridae:		
<i>Acipenser ruthenus</i> L.	+	+
Family Clupeidae:		
<i>Clupeonella cultriventris</i> (Nordmann)	+	+
Family Esocidae:		
<i>Esox luceus</i> L.	+	+
Family Cyprinidae:		
<i>Rutilus rutilus rutilus</i> (L.)	+	+
<i>Leuciscus leuciscus leuciscus</i> (L.) **	+	+
<i>Leuciscus cephalus cephalus</i> (L.) **	+	+
<i>Leuciscus boristhenicus</i> (Kesster)	+	+
<i>Leuciscus idus idus</i> (L.) **	+	+
<i>Phoxinus phoxinus</i> (Pallas)	+	+
<i>Scardinius erythrophthalmus erythrophthalmus</i> (L.)	+	+
<i>Ctenopharyngodon idella</i> (Valenciennes) ***	+	+
<i>Aspius aspius aspius</i> (L.)	+	+
<i>Leucaspis delineatus</i> (Heckel)	+	+
<i>Tinea tinea</i> (L.)	+	+
<i>Chondrostoma nasus nasus</i> (L.) **	+	+
<i>Pseudorasbora parva</i> (Tetmminck et Senlegeh) ***	+	+
<i>Gobio gobio gobio</i> (L.)	+	+
<i>Gobio albipinnatus belingi</i> (Slastenenko) ***	+	+
<i>Alburnus alburnus alburnus</i> (L.)	+	+
<i>Blicca bjoerkna</i> (L.)	+	+
<i>Abramis brama</i> (L.)	+	+
<i>Abramis sapa</i> (Pallas) **	+	+

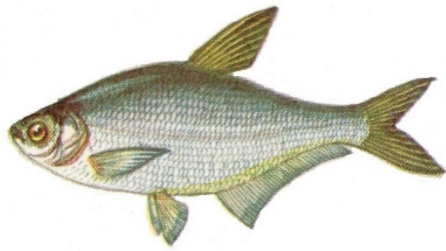
1	2	3
Abramis ballerus (L.)	+	+
Vimba vimba vimba (L.) *	+	+
Pelecus cultratus (L.) **	+	+
Rhodeus amarus (Bloch)	+	+
Carassius carassius (L.) **	+	+
Carassius auratus gibelio (Bloch)	+	+
Cyprinus carpio L.	+	+
Hypophthalmichthis molitrix (Valenciennes) ***	+	+
Aristichthys nobilis (Richardson) ***	+	+
Family Cobitidae:		
Barbatula barbatula (L.)	+	+
Cobitis taenia L.	+	+
Misgurnus fossilis (L.)	+	+
Family - Siluridae:		
Silurus glanis L.	+	+
Family - Gadidae:		
Lota lota (L.)	+	+
Family - Gasterosteidae:		
Pungitius platygaster platygaster (Kessler)	+	+
Gasterosteus aculeatus L.	+	+
Family - Syngnathidae		
Syngnatus abaster nigrolineatus (Eichwald)	+	+
Family - Percidae:		
Sander lucioperca (L.)	+	+
Perca fluviatilis L.	+	+
Gymnocephalus cernuus (L.)	+	+
Gymnocephalus acerinus**	+	+
Family Gobiidae:		
Neogobius melanostomus (Pallas)	-	+
Neogobius melanostomus (Pallas)	+	+
Neogobius kessleri (Gunther)	+	+
Neogobius gymnotrachelus gymnotrachelus (Kessler)	+	+
Mesogobius batrachocephalus (Pallas)	+	+
Benthophiloides brauneri Beling et Iljin	+	+
Benthophilus stellatus ** stellatus (Sauvage)	+	+

Notes: (+) - presence, (-) - absence, * - endangered species, ** - a rare species, *** - new species-universes.

1 - Kaniv Reservoir; 2 - Kremenchug reservoir.

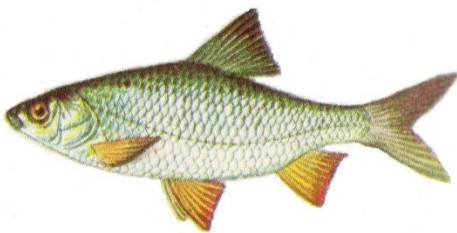
According to statistics, 17 species are of industrial importance, including large particles: abramis brama (L.), hypophthalmichthis molitrix (valenciennes), silurus glanis L., esox luceus L., cyprinus carpio L., sander lucioperca (L.), ctenopharyngodon idella (valenciennes), aspius aspius (L.), leuciscus leuciscus leuciscus (L.); finely divided: rutilus rutilus (L.), blicca bjoerkna (L.), abramis ballerus (L.), perca fluviatilis L., carassius carassius (L.), pelecus cultratus (L.), as well as the leukaspius delineatus (heckel) and clupeonella cultriventris (nordmann).

Biology of major industrial fish species within the Cherkasy region



Abramis ballerus. The most common species among fish. It is found in many rivers, lakes and brackish water bodies. In the Dnieper basin, this species is found along its entire course. The size of adults reaches 30 centimeters [10].

Spawning occurs in late April - early May, in more northern areas - in June. Ukrainian ichthyologists believe that the youth of the bream in the Dnieper basin feeds mainly on plant components, zooplankton and only in some cases - chironomids. Some researchers say that the bream feeds on benthos, which is why it is classified as benthic.



Rutilus rutilus. Widespread species. A member of the carp family. It is found in large and small rivers, streams, as well as in reservoirs and lakes. The size of adults varies from 15 to 30 cm, depending on the habitat [13]. Spawning occurs mainly in May. It feeds mainly on

plants, small mollusks and insect larvae. It adapts well to various trophic conditions, thus explaining its wide distribution.

Plays an important role in feeding such predatory fish as perch and pike. It spawns mainly in large (sometimes up to tens of thousands of fish) flocks.



Hypophthalmichthys molitrix. Valuable commercial fish. It feeds mainly on phytoplankton. It is quite large, up to a meter long and weighs up to 8 kilograms and more. Spawning occurs in summer.

Puberty occurs at 5-6 years of age [7]. Males become sexually mature earlier than females. After spawning, it enters small lakes and small tributaries where there is a sufficient amount of algae. For spawning conditions, raising the water level, increasing its turbidity and temperature conditions of 26-30 ° C is mandatory. The female thickly foreheads lays up to half a million pelagic eggs. Lives in large flocks, easily acclimatized.



Clupeonella delicatula. It is an industrial species, can withstand significant fluctuations in water salinity, can live permanently in fresh water, which was finally clarified after the creation of the Kakhovka Reservoir in the lower reaches of the Dnieper. Body length does not exceed 10 cm,

weight 7-8 g. From the Kakhovka Reservoir, the tulk penetrated through sluices into reservoirs located upstream of the Dnieper, for example, in Kremenchug, where it also became an industrial facility. So in a short time it turned from a semi-permeable to a typical freshwater fish. Spawning occurs near the water surface at a temperature of 8 - 9 to 20 - 24 ° C. Lives no more than four years, more often - three [10, 13].

The *Clupeonella delicatula* lives no more than four years, more often three. The main object of nutrition are plant and animal organisms living in the water column.



Alburnus alburnus. Belongs to the carp family. It begins to reproduce in the second year of life. The eggs are laid at a water temperature of not less than 15 ° C for several receptions on soft vegetation.

Females with a length of about 10 cm have up to 10 thousand eggs [8]. She can lay at least 700 eggs in one go. One female spawns for about a month.

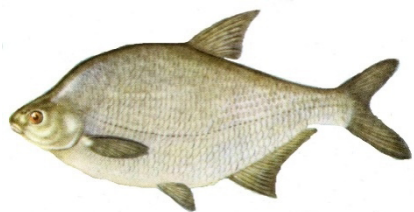
Alburnus alburnus grows quite quickly. Most often the body length does not exceed 15 cm, although sometimes there are individuals up to 20 cm. Their age, as a rule, does not exceed four years. Verkhovodka has no special industrial significance. However, in autumn, when the flocks reach significant sizes, it is caught on an industrial scale.

This is an extremely mobile fish, kept mainly in low water, but for food can go to a relatively fast current. Herds of vertebrates look for larvae of insects, crustaceans, algae, as well as insects that fall into the water. *Alburnus alburnus* also feeds on fish roe and their larvae. In the bottom layers it sinks during cooling and for the winter.



Alicca bjoerkna. According to external morphological features and biological indicators, as well as the relative mass of internal organs (heart, spleen, liver, kidneys) guster should be classified as a genus of bream. near the dorsal fin

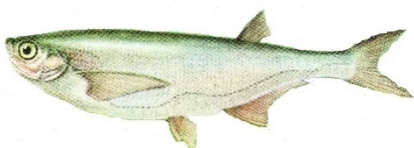
and on the back. Paired fins are yellowish, sometimes even reddish, which is not the case with bream. They are kept in herds and in almost the same places. Prefer water bodies with slow flow or standing water. *Alicca bjoerkna* and *Abramis brama* compete for food. That is why in the case of economic activity, scientists recommend limiting the number of lizards, because it grows more slowly, bream, at the same time reaches a much greater body weight. Guster spawns in May - June in the third year of life. Has significant fertility.



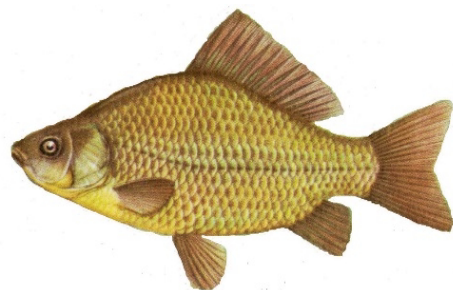
Abramis brama. Belongs to the carp family. Fish of this species are kept in flocks and almost constantly in the same places. Prefer reservoirs with slow flow or standing water. Young people live in the coastal zone, go to places with sparse thickets.

Spawning *Abramis brama* begin at age four. In the spawning herd bream are always slightly dominated by males. By the age of ten, there are always more males than females among their peers. In the next three years, the number of males and females is about the same, and from the age of fourteen to sixteen there are no males at all. The fertility of female bream increases depending on body length, weight and age. For example, females 25-30 cm long found an average of 120.4 thousand eggs, 50-55 cm long - 583.6 thousand females, weighing 300-600 g, throw 95 thousand eggs, and those of them whose weight is 3300-3600 g, - 600.5 thousand [8].

The *Abramis brama* spawns at a water temperature of about 15 - 18 ° C at a depth of 0.5 - 1 m. Shallow water leaves before wintering no earlier than October.

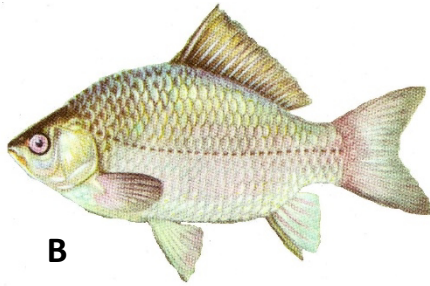


Pelecus cultratus. Belongs to the carp family. It is kept in open areas of reservoirs (in the water column from where it often rises to its surface). The main places of summer stay are the channels of large rivers and reservoirs with considerable depths and fast currents. In the reservoirs of the Dnieper spawns for the first time at the age of three or four. It feeds on fish, which is dominated by tulle, algae, crustaceans, insects. An important object of fishing. It is especially fatty in late autumn and early spring. It is most often consumed dried.



A
fauna, the silver *carassius* is brought to our region from the Amur basin. It, like its predecessor, is very unpretentious to living conditions, so it has spread to all river basins of Ukraine, reservoirs, lakes and ponds.

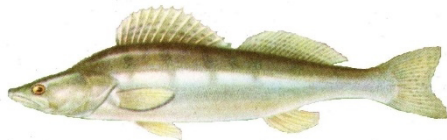
Carassius. There are two types of crucian carp in Ukrainian reservoirs: golden (*C. carassius*) (A) and silver (*C. auratus gibilio*) (B). Golden *carassius* lives mainly in wetlands, because it is very unpretentious to the oxygen regime. If the golden *carassius* is a native of our



Silver *carassius* grows fast. Lives mainly in wetlands, because it is very unpretentious to the oxygen regime. If the golden *carassius* is a native of our fauna, the silver *carassius* is brought to our region from the Amur basin. It, like its predecessor, is very unpretentious to living conditions, so it has spread to all river basins of Ukraine, reservoirs, lakes and ponds. Silver

carassius grows fast.

Silver *carassius* is very scary, although it is more common in young fish. For example, with the approach of fishing gear or other disturbances, young animals 70-120 g (two-year-olds) can be buried in the silt to a depth of 20-25 cm, and weighing 5-15 g (this year) - to a depth of 7-10 cm. , the weight of which exceeds 350-400 g, do not leave the place where they were disturbed. It feeds on plant and animal food. For the first time a crucian begins to spawn in the third year of life. The eggs are laid at a water temperature of not less than 15 - 16 ° C in separate portions [8]. The silver *carassius* has a longer spawning period than the golden crucian.



Lucioperca lucioperca. Belongs to the perch family. A typical predator. Lives in rivers, reservoirs, flowing lakes, where he chooses deep places near cramps. Spawns in floodplains, in coastal areas of

lakes, reservoirs. Lays eggs on the basal parts of plants. Interestingly, to increase weight by one kilogram, *lucioperca lucioperca* must eat an average of 3.3 kg of fish. He consumes fish, the size of which ranges from 3-4 to 20-24 cm, which is from 6-8 to 30-36% of the length of his body [8]. *Lucioperca lucioperca* has many enemies, pike, catfish, other predators, and *Lucioperca lucioperca* eggs are also destroyed by invertebrates, especially cyclops.

Information on fishing in the Cherkasy region for the Kaniv Reservoir is provided by the Office of the State Agency for Fisheries in Kyiv and Kyiv region, for the Kremenchug Reservoir - the Office of the State Agency for Fisheries in the Cherkasy region is given in table. 8.

8. Dynamics of fishing

Year	Approved catch limit, t / year	Actual catch, t / year
2017	3702**	4668,411
2018	4007**	4583,092
2019	5634,2**	5197,514
2017	607,0	149,762
2018	704,0*	101,148
2019	501,0**	165,544

* -limited four species of fish: bream, gossip, flatfish, pike perch.

** - three types of fish are limited: bream, gossip, pike perch.

Theriofauna of the region.

Mammals - highly organized vertebrates, which are characterized by warm-bloodedness, fetal development (for the vast majority of members of the class) and breastfeeding. Due to their adaptation to different conditions, mammals are characterized by a wide variety of habitats and body sizes. Mammals are no less diverse in the nature of their diet, some of them herbivores, others carnivores.

To date, the fauna of Cherkasy region has 68 species of mammals (table 9).

9. Species list of mammals of Cherkasy region

	View	Status of the species
1	2	3
A number of Insectivora		
1	<i>Erinaceus rumanicus</i>	++
2	<i>Talpa europaea</i>	++
3	<i>Sorex araneus</i>	++
4	<i>S. minutus</i>	+
5	<i>Neomys fodiens</i>	+
6	<i>Neomys anomalus</i>	+
7	<i>Crocidura suaveolens</i>	+
8	<i>C. leucodon</i>	+
A number of Chiroptera		
9	<i>Myotis nattereri</i>	+
10	<i>M. daubentonii</i>	++
11	<i>Plecotus auritus</i>	+
12	<i>P. austriacus</i>	+
13	<i>Barbastella barbastellus</i>	+
14	<i>Nyctalus noctula</i>	++
15	<i>N. leisleri</i>	–
16	<i>N. lasiopterus</i>	–
17	<i>Pipistrellus nathusii</i>	++
18	<i>P. kuhlii</i>	++
19	<i>P. pipistrellus</i>	+
20	<i>Vespertilio. murinus</i>	+
21	<i>Eptesicus serotinus</i>	++
A number of Lagomorpha		
22	<i>Lepus europaeus</i>	++
23	<i>Oryctolagus cuniculus</i>	–
A number of Rodentia		
24	<i>Sciurus vulgar</i>	++
25	<i>Citellus suslicus</i>	–
26	<i>C. pygmaeus</i>	–
27	<i>Spalax sp.</i>	–
28	<i>Rattus norvegicus</i>	++
29	<i>Mus musculus</i>	++
30	<i>Microtus minutus</i>	+
31	<i>Apodemus sylvaticus</i>	++
32	<i>A. flavicollis</i>	++

1	2	3
33	<i>A. agrarius</i>	++
34	<i>Mus spicilegus</i>	+
35	<i>Cricetus cricetus</i>	–
36	<i>Cricetulus migratorius</i>	–
37	<i>Ondatra zibethica</i>	++
38	<i>Castor fiber</i>	++
39	<i>Arvicola terrestris</i>	++
40	<i>Clethrionomys glareolus</i>	++
41	<i>Microtus arvalis</i>	++
42	<i>M. oeconomus</i>	+
43	<i>M. subterraneus</i>	–
44	<i>Glis glis</i>	+
45	<i>Dyromys nitedula</i>	+
46	<i>Eliomys quercinus</i>	+
47	<i>Muskardinus avellanarius</i>	+
48	<i>Sicista subtilis</i>	+
49	<i>Myocastor coypus</i>	–
A number of Carnivora		
50	<i>Canis lupus</i>	+
51	<i>Vulpes vulpes</i>	++
52	<i>Nyctereutes procionoides</i>	++
53	<i>Martes foina</i>	++
54	<i>M. martes</i>	+
55	<i>Mustella nivalis</i>	+
56	<i>M. erminea</i>	–
57	<i>M. lutreola</i>	+
58	<i>M. vison</i>	++
59	<i>M. eversmanni</i>	–
60	<i>M. putorius</i>	++
61	<i>Meles meles</i>	+
62	<i>Lutra lutra</i>	+
A number of Artiodactyla		
63	<i>Sus scrofa</i>	++
64	<i>Capreolus capreolus</i>	++
65	<i>Alces alces</i>	+
66	<i>Cervus nippon</i>	++
67	<i>C. dama</i>	–
68	<i>C. elaphus</i>	+

Notes: ++ - numerical; + - rare; - - no data for the last 20 years.

Hunting theriofauna.

Some mammalian species can significantly affect agrolandscapes, causing both significant harm and benefit. For example, hares and some ungulates, in particular roe deer at certain times of the year (winter - early spring) can cause significant damage to both crops and trees by biting the bark and young shoots. During feeding, the wild boar plows large areas of land, extracting young shoots of plants, rhizomes and small animals (invertebrates and some vertebrates). Such digging activities significantly affect the restoration of forest crops. On the one

hand, pigs promote reforestation by burying some of the seeds in the ground, on the other hand, they cause significant damage to agrocenoses by plowing large areas of agricultural land in search of food. Some species of predators, such as foxes, are very important in agriculture. Its main benefit is that it is one of the main rodent killers, especially in the fields, as rodents make up to 90% of its diet. The downside is that the fox often causes some known damage by destroying other hunting animals (hares, roe deer cubs) and domestic birds, for which the fox is a carrier of rabies. Thus, the increase in the number of hunting species of animals can significantly affect agrolandscapes (and not necessarily negatively), and therefore it is important to conduct records to regulate their numbers [26, 25, 27, 31, 64, 50].

The dynamics of the number of major species of hunting animals are presented in tables 9 - 10.

10. Dynamics of the number of main species of ungulates (heads)

Types of hunting animals, heads	Year			
	2016	2017	2018	2019
Capreolus	7738	7565	7727	7727
Sus scrofa	2529	1277	1167	1167
Cervus nippon	492	564	663	663
Cervus elaphus	-	-	139	139
Alces	69	81	85	85

The information was provided by the Cherkasy Regional Department of Forestry and Hunting

11. Dynamics of the number of major species of hunting animals (heads)

Types of hunting animals	Number during the years				
	2015	2016	2017	2018	2019
Hooves	10950	10954	9922	9524	9642
Fur	53724	53622	55056	54431	54474
Feathered	366298	362874	385697	391318	39990 6

The information was provided by the Cherkasy Regional Department of Forestry and Hunting

Information on the extraction of the main species of hunting animals by year is presented in table 12.

12. Extraction of the main species of hunting animals

Year	Species of hunting animals	Approved catch limit	Licenses is sued	Obtained licenses	Non obtained licenses	Reason for non-use
2017	<i>Deer</i>	54	54	54	0	Adverse weather conditions, African swine fever
	<i>Boar</i>	549	355	59	296	
	<i>Roe deer</i>	722	670	453	217	
2018	<i>Boar</i>	363	255	53	202	
	<i>Roe deer</i>	943	798	639	159	
	<i>Spotted deer</i>	79	56	35	21	
	<i>European deer</i>	4	2	0	2	
	<i>Beaver</i>	20	10	0	10	
2019	<i>Boar</i>	277	240	90	150	
	<i>Roe</i>	1037	930	743	187	
	<i>Spotted deer</i>	92	88	49	39	
	<i>European deer</i>	3	3	0	3	
	<i>Beaver</i>	20	10	0	10	

The information was provided by the Cherkasy Regional Department of Forestry and Hunting

Industrial ungulates are in a threatening condition. This is largely due to unauthorized shooting and a reduction in the area of residential stations. As a result, moose are found only at crossings, the number of deer, roe deer, and wild boar has decreased, and the area of natural habitats of hunting animals is rapidly declining, so the number of animals that cannot adapt to agrocoenotic landscapes is declining or approaching extinction. The density of hunting animals due to the expansion of agrocoenotic landscapes is unevenly distributed in space, so their populations are forced to move constantly. To preserve these species of animals and effective nature protection, it is necessary to increase the area of nature reserves to scientifically sound sizes. After all, the national program for the formation of the national ecological network provides for an increase in the area of NPF lands to 10.4% in 2015. It should be noted that the optimal percentage of protected areas is 30-40%.

Hunting avifauna

Development in the floodplain of the Dnieper River has led to significant changes in the population of birds of the Dnieper, its qualitative and quantitative indicators, spatial structure, nesting biology of certain species. Prior to the construction of reservoirs in the floodplain of the Middle Dnieper, according to literature data, there were 295 species of birds, of which 173 nesting (including 46 sedentary), and the remaining 122 - migratory, migratory and flying.

According to P. P.Orlov, the number of birds caught by hunters only in the Cherkasy region during the hunting season in 1938 was 106,188 birds, including: ducks - 70,647 heads, including mallard - 15,627 goals;

shepherds - 13,024 goals, including fox - 9367 goals; waders - 9076 goals, incl. snipe - 2755 goals; pigeons - 2709 goals; chicken - 2830 goals.

The current dynamics of the number of bird species indicates that the most common species in the Cherkasy region are ducks - 90,677 individuals. Over the past ten years, the number of swans has almost halved.

At the same time, the total number of industrial bird species in Cherkasy region, compared to 1996, decreased by 10,325 individuals, or 3.6%. This is due to the reduction of habitats of these species under the influence of intense anthropogenic factors. Particularly threatening forms are the reduction in the number of pheasants by 50.6%. Particular attention should be paid to reducing the already small amount of gray partridge, which is famous not only as a valuable hunting species, but also for eating insects. Thus, it is advisable to promote the reproduction and settlement of this species, which by destroying pests and eating weed seeds, can become an important biological means of supporting the stable development of modern agrocenoses [19, 20, 21, 22, 28].

Bats and their role in agrocenoses

The fauna of bats of the Cherkasy region today has 13 species (two species are known from literary sources). Only in the projected national nature park "Cold Yar" found 10 species.



Nyctalus noctula is a fairly numerous species. Occurs both in forest ecosystems and in settlements. As hiding places used as hollows of trees (oak, pine, willow), as well as human buildings (brick houses). Unfortunately, not enough large colonies were found. The species is capable of seasonal migrations.



N. leisler – recently in the region is not registered, but there are publications about the discovery of this species [17]. The species is quite rare.



Lasipterus - is a species not registered in the region. There are old publications that contain information about the presence of this species [2].



Pipistrellus kuhlii – is a fairly common species, zoogeographically new to the fauna of the region. An invasion has been observed in Ukraine recently. Typical stations are habitats of settlements. The species is a true synanthrope. Does not show seasonal changes in habitat, settled. He uses human buildings as hiding places. No mass colonies were found.



Pipistrellus nathusii - is a fairly common species that inhabits forest ecosystems. As hiding places uses tree hollows (oak, hornbeam, maple). No mass colonies were found.



P. pipistrellus – occupies an intermediate position between the Mediterranean and forest bats in the Cherkasy region. As hiding places uses hollows of trees, less often human buildings. Typical habitats are gardens, forests and coastal areas of reservoirs. No mass colonies were found.



Plecotus auritus – does not form large clusters. Not numerical. On the territory of Cherkasy region it is found in forests, gardens, parks of settlements. He uses tree hollows and human buildings as hiding places.



P. austriacus – does not form mass clusters in the region. Found only in settlements. In zoogeographical terms, the species is new for the Cherkasy region.



Barbastella barbastellus – is a rare species. Inhabitant mainly of forest ecosystems. It is not common in the Cherkasy region. He uses tree hollows and hiding places of anthropogenic origin as hiding places. Typical seasonal migrations.



Myotis nattereri – is a rare species. In the region it occurs by chance. Inhabitant of forest ecosystems. No mass clusters were recorded.



M. daubentoni - is a fairly common species. Typical habitats are aquatic and near-water ecosystems. No mass clusters found.



Eptesicus serotinus – is a fairly common species. As hiding places uses only human buildings in settlements. This species is characterized by the phenomenon of daily migrations. It uses parks and forest glades as hunting stations. No mass accumulations were found in the Cherkasy region.

Vespertilio. murinus – occurs sporadically in the region. Does not form large clusters. Typical habitats are forest habitats and habitats of settlements. Settles both in hollows of trees, and in human buildings. Has a tendency to synanthropy.

Bats are an important component of terrestrial ecosystems and at the same time are a vulnerable group of mammals [17]. Feeding on insects, among which there are many pests of crops, gardens, forests, bats are very useful. The value of rare species is quite meager, but in total all species of bats will destroy a very large number of different insects - from mosquitoes to beetles. The activity of bats is especially important precisely because we have no nocturnal species of insectivorous birds, not taking into account the dormouse. Hence, those pests that are active at night are destroyed only by bats. Thus, the relevance of the chosen topic for research is important in two aspects: environmental and the possibility of involving bats in the means of biological control of harmful insect species, especially for agriculture [17, 49, 62, 65].

Chapter 3

Biodiversity of objects and territories of the nature reserve fund of national importance of Cherkasy region

In Cherkasy region, active work is being done to create new and expand the boundaries of existing territories and objects of the nature reserve fund for the preservation, reproduction of typical and unique natural complexes of biotic and landscape diversity, the formation of ecological network (Table 13).

13. Structure and dynamics of nature protection objects by years (national and local significance)

Category of NRF object	Quantity				Area, thousand ha				Area of territories of strict reserve			
	1995	2000	2016	2019	1995	2000	2016	2019	1995	2000	2016	2019
Biosphere reserves	-	-	-	-	-	-	-	-	-	-	-	-
Nature reserves	1	1	1	1	2026,9	2026,98	8657,2	8657,2	2026,9	2026,98	8657,2	8657,2
National nature parks	-	-	2	2	-	-	11227,1	11227,22	-	-	-	-
Regional landscape parks	-	1	1	1	-	5562,5	5562,5	5562,5	-	-	-	-
Reserves	134	168	222	236	16244,9	25302,3	42487	43146,39	-	-	-	-
Protected tracts	25	40	52	52	3828,9	4149,0	3743,3	3743,09	-	-	-	-
Sights of nature	131	163	192	198	1176,8	1170,5	1887,4	1887,49	-	-	-	-
Botanical gardens	-	-	-	-	-	-	-	-	-	-	-	-
Arboretum parks	1	1	1	1	160,0	160,0	179,18	179,18	-	-	-	-
Zoos	1	1	1	1	8,0	8,0	4,37	4,37	-	-	-	-
Parks - monuments of garden and park art	33	38	59	64	1288,2	1327,1	1386,1	1419,38	-	-	-	-

The total area of the nature reserve fund of the region in 2019 was increased by 478.09 hectares.

In the same year, 9 objects of the nature reserve fund of local significance were declared,

Work is underway to create national nature parks "Cold Yar" and "Middle Dnieper".

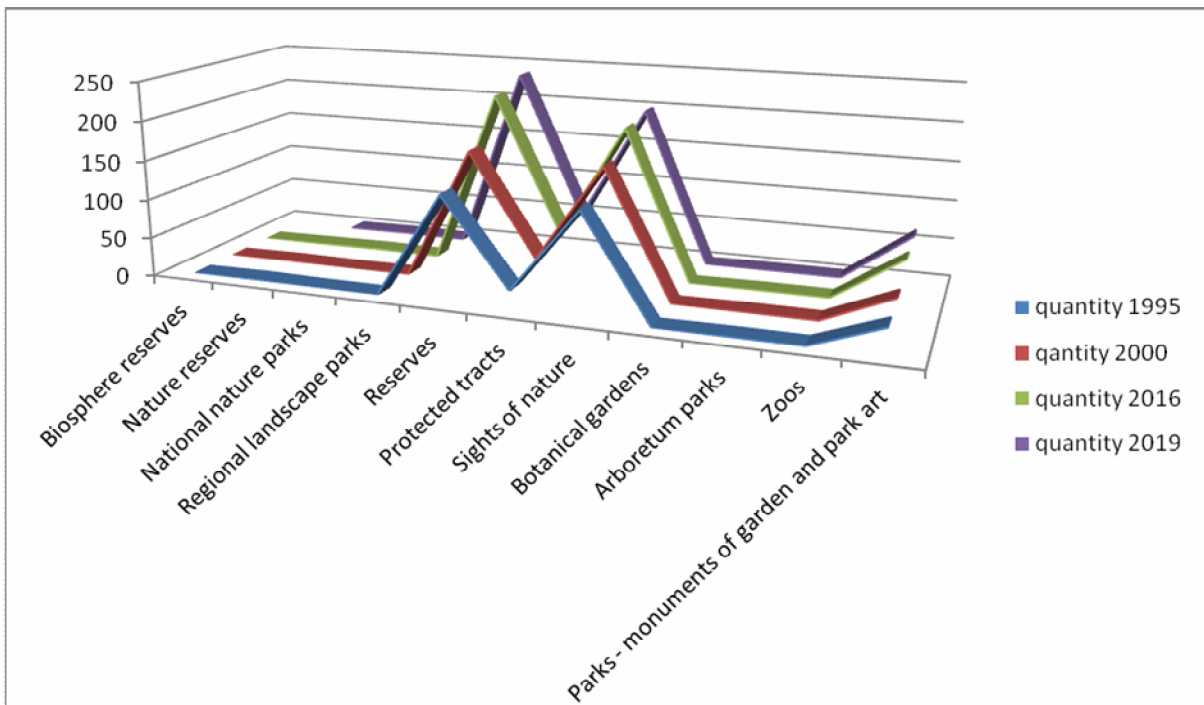


Fig. 4. Dynamics of quantitative composition of nature protection objects over the years

Nizhnosulsky National Nature Park

NNP "Nizhnosulsky" was created in accordance with the Decree of the President of Ukraine of February 10, 2010 on the basis of Sulina Landscape Reserve (created in 1998 on an area of 7871.3 hectares). Currently, the total area of the park is 18,635.11 hectares, of which 1,315 hectares with withdrawal.

The park is located in the lower part of the valley of the Sula River, which as a result of flooding of the Kremenchug Reservoir turned into the water area of the bay.

The boundary of the park is the shoreline and the boundary between the floodplain and the higher terraces on the right bank of the Sula from the village of Tarasivka, Hrebinka district, Poltava region to Cape Zhovnyne (southeast of the village of Zhovnyne, Chornobayiv district, Cherkasy region) and on the left bank to the village of Shushvalivka, Globinsky district, Poltava region.

In the south, in the water area of the bay, the border is the line from Cape Zhovnyne to the southern outskirts of the village of Shushvalivka.

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According to the physical and geographical zoning, the territory of the NNP belongs to the Obolonsko-Gradizky district, the Southern Forest-Steppe region of the Dnieper terrace plain, the Left-Bank-Dnieper forest-steppe province, the Forest-steppe zone. According to the scheme of geobotanical zoning, it is located within the Obolon-Kobeliatsky geobotanical area of terraced meadow steppes, meadow-halophilous vegetation and eutrophic valley bogs, Romensko-Poltava geobotanical district, Left Bank Dnieper subprovince, Eastern European region, Eastern European region. The bay itself cuts deep (37 km) along the valley of the Sula River, but due to the winding length of the shore along the water area here is several times the length of the bay itself. The landscape complex of the park is a water area together with shallow waters and islands formed as a result of flooding of the floodplain and low areas of the first floodplain (pine) terrace.

The parent rock on the residual areas of the lands are medium-grained and fine-grained sands on which weakly podzolic and sod-podzolic soils are formed.

The main part of the park is water and coastal-water biogeocenoses. Among the higher aquatic vegetation, the most common are groups of rooted aquatic plants. Everywhere in strips to a depth of 1.5 - 2 m thickets of reddish brilliant are formed. Closer to the shore, in areas of bays and riverbeds with slow water flow, huge areas are occupied by groups dominated by white water lilies. Most shallow water up to a depth of 1 m is occupied by thickets of air-water vegetation. Throughout the park they are dominated by reeds. Less often, in separate groups, there are groups with a predominance of narrow-leaved cattail. In the marginal areas of the coast, most hydrophytes and hygrophytes of our flora meet with them. Quite often there are marsh iris, European and tall wolfberry, meadow willowherb, willowherb, plantain, sweet and bitter nightshade, dioecious nettle, hemlock poison, hellebore and spearmint, water mint, comfrey and butterbur, others. Rarely can be found fragments of groups with a predominance of coastal sedges, vesicles, acutely visible, false-shriveled, panicle-bearing, swamp sedge, marsh sedge, common reed warbler. Scattered fragments along the shore are grouped with the dominance of calamus. Of the groups dominated by woody plants on the coasts are rarely found thickets of

willow. In drier and periodically flooded areas, ash-gray willow thickets are formed.

Large areas of land of the pine terrace are occupied by a variety of terrestrial vegetation. On one of these, in the Chubarove tract, which is a shaft-like increase in the segment of the pine terrace in the middle of the floodplain, deciduous forests are widespread. The surface of the tract is flat. Among the positive forms, slight elevations increase in height. In the peripheral, marginal zone of the island, the angle of inclination of the surface is 3-5 degrees and the surface for several tens of meters smoothly passes to areas of flooded floodplain. The soil cover is formed by fresh medium-podzolic soils.

In the marginal strip of the coast are often thickets of willow ash. Sometimes small areas are occupied by fragments of forests of white-tailed willow eagle.

Most of the area of the island is occupied by fresh oak groves. The stand is dominated by common oak (up to 70% coverage). As an impurity, the elm is found everywhere. Some stands in the stand are dominated by artificially planted robinia pseudoacacia and Scots pine, under the tent of which maple ash is widespread. The size of the trees and some of their other characteristics indicate their considerable age. Under the tent of the upper tier there are Tatar maple, hazel, European cowberry, hawthorn, black elder. In some places, some of them provide coverage of up to 30-40%. Among the undergrowth of trees, the most common are smooth elm, maple, and occasionally common oak. Trivial ruderal and nitrophilic species, such as dioecious nettle, horse garlic, large celandine, five-bladed dog nettle, urban gravilat, butterbur, wood buckthorn, butterbur, black. Among the typical deciduous grasses are noted European ungulate, May lily of the valley, multi-flowered bush, forest dogwood, multi-flowered bush, giant bonfire, forest purslane. From the group of spring ephemeroids and hemiephemeroids, compacted growth, anemone jaundice, adoxa musk, and snowdrop bifoliate grow everywhere. Along the quarter clearings and forest roads, thickets of individual herbaceous plants such as vegetable onions, buckthorn, and annual stenactis are common. In areas of small elevations, where due to the worst conditions of moisture, sparse forests are formed in the tier of grasses, there are representatives of the sub-flora. The most common are ground marten, mountain smelt, false Phrygian cornflower, true butterbur. There were also dream-grasses deciduous and black. The scattered island massifs of former hayfields and pastures, being isolated by a water body from the forest massifs, are now at the stage of beginning the formation of forest vegetation. They are characterized by individual fragments of pioneer forests, represented by stands of white willow, hanging birch, black poplar, white and aspen, ie those species of trees whose seeds are carried by the wind over long distances. Such

forests in these isolated areas of land are distributed mostly in their peripheral segments, and in the central part of them are dominated by groups of grassy vegetation. High-grass meadows with sharp and sharp sedge dominance are often found on the slopes. Some fragments among them are common thickets of marsh iris, common willowherb, willowherb, hemp seedling. At the bottom of the saucer-shaped depressions is mostly dominated by sharp sedge, among which there are avran doctor.

The Pishchane tract is occupied by artificial plantations of Scots pine on the wind-blown sands of the pine terrace. Most areas are characterized by young and medieval pine plantations without a pronounced layer of grass. Psamophilic phytocenoses with co-dominance of bluegrass, wormwood, immortelle, Dnieper cornflower, and Becker's bonfire are found on meadows with dry, sandy, slightly soddy podzolic soils. In such herbivores are often found the brave Tatar, Zlinka Canadian, flax drokolista, goldenrod, stag hornbeam, milkweed Segiev, corolla woolly, rye comb, bream paniculate, astragalus, thyme, marshal thyme, straight scavenger. Curtain sedges and rhizomatous Russian thickets grow in some places.

A large area along the left bank of the Sula Bay is occupied by meadows, which are flooded during floods and grazed by cattle during the summer. The basis of grass in meadows are early sedge and creeping wheatgrass. There are light sedge, eastern fireweed, field thistle, foxglove goose paw, Gerard's sorrel, horse sorrel, cockroach and others.

In general, the vegetation of the park is in a state of demutation processes caused by changes in its mode of operation and rising water levels.

The background species in the park among ratites is a wild boar. Particularly high concentration of wild boar is observed in dense thickets of reeds near about. Chubarove.

The roe deer is found in the forests of the indigenous areas of the land and on individual islands.

Common species among carnivorous mammals are fox, ermine, weasel. Raccoon dog - a background species on island territories.

In the forests of indigenous areas and on forested islands, the forest marten lives permanently. The stone marten comes to the forest plantations near Sulsky Pleso from the settlements. Badger digs burrows in forest belts, within forest plantations. His settlement was also found on Fr. Birches. Traces of river otters are sometimes found on the shoals of the coastal strip. A rare species in natural habitats is the ferret, the American mink. Occasionally in the woods noted traces of wolves. In one case, a wolf brood was found on a hard-to-reach small island. The river beaver is now a numerous species near water bodies.

A hut of a large river beaver was found near Sulsky Pleso between the village of Velyka Burimka and the village of Mykhailivka. Red fistula, yellow-throated mouse, field mouse, common fistula have been registered in the composition of murine rodents, and common woodpecker among insectivores. Traces of water fistula have been noted along the coastal strip. Among the floodplains is often found muskrat. In the steppe area near Sulsky Pleso in the vicinity of the village. Lyashchivka is a colony of blind people.

The park is located on the Sul Bay of the Kremenchug Reservoir, which belongs to the areas of international importance for the protection of birds (ibA - important bird Area). It plays a crucial role in protecting migratory waterfowl flocks. About 100 species of birds have been found nesting here. A significant number of coots, black and white-cheeked terns, common martin, gray heron. Among the rare species on nesting found yellow heron, Caspian martin, sandpiper, sandpiper, steppe derichvist, white-tailed eagle, black shulika. Clusters of up to 8,000 ducks, 2,000 geese, 10,000 coots, and 8,000 sandpipers were observed during flights in Sul Bay (Klestov et al., 1995; Wetlands of Ukraine, 2006). [19, 21].

According to ML Klestova (personal report), 3 pairs of white-tailed eagles nest within the park. Flying flocks of gray geese are regularly found in the thickets of aquatic vegetation. Whooper swans nest. Amphibians are represented by 4 species, and reptiles - 2 species. Pond and lake frogs are quite numerous species. Often there are kvaksha, spring. Among reptiles, numerous species are already common. Occasionally there is a common viper.

The general ecological significance of this area for the natural complex of the Lower Sul Bay is determined by:

a) ensuring the protection of local populations of rare and endangered species of flora and fauna;

(b) the conservation of the types of habitats important for the maintenance of the region's biogeocenotic diversity to be protected in accordance with Annex I of the Berne Convention, revised in Annex I (4 of 1996), in particular:

- C1.34 rooted-floating vegetation of eumesotrophic reservoirs with dominance of white water lilies;

- C3.41 Euro-Siberian groups of coastal aquatic vegetation with sedges, reeds, cattails, plague, etc .;

- E 3.4 fresh and moist mesotrophic onions with a predominance of meadow foxtail, meadow foxtail, early sedge, ground marten, creeping wheatgrass;

- E5.4 wet and wet highly digestive onions with a predominance of marshmallow, viper;

- G1.11 coastal floodplain forests dominated by white willow, black and white poplar;

- G 1.2 mixed and deciduous forests of large river valleys dominated by oak, smooth elm and tall ash;

c) the importance of this area as a field of natural surface wastewater treatment, which is widely used for water supply in the southern regions of Ukraine;

d) the role of this territory as a spawning ground for most of the populations of industrial fish species (bream, carp, crucian carp, roach, catfish, golovan, verkhovod, etc.) of the Kremenchug reservoir. [8]

Kaniv Nature Reserve.

The reserve was established in accordance with the Resolution of the People's Commissariat of Land Affairs of the USSR of July 30, 1923 №156 as the State Forest-Steppe Reserve. T.G. Shevchenko. Then in 1933 the name was changed to the Middle Dnieper Reserve, in 1939 to the Biogeographical Reserve of Kyiv State University. T.G. Shevchenko.

In 1951 the reserve was liquidated and only in 1968 it was restored as the Kaniv State Reserve, subordinated to the Taras Shevchenko National University of Kyiv.

The total area of the reserve is 2026, 98 hectares.

Kaniv mountains on the territory of the reserve have long been of interest to poets and artists. This is where Taras Shevchenko dreamed of spending the last years of his life. But his dream did not come true. The poet found only eternal rest in May 1861 on Chernecha Hill.

Geologists have noted that the deposits of the Jurassic, Cretaceous, and Tertiary systems are raised, lie above the level of the Dnieper, and are folded, with the old systems often covering the younger ones, including the Quaternary.

The Kaniv Mountains are no less interesting for historians. Farmers, Trypillians, nomadic tribes of the pit culture, Scythian plowmen, and our closest ancestors, the ancient Slavs, lived here for thousands of years, replacing each other.

The fortifications of the ancient Russian city of Roden once stood on Kniazha Hill. It was in Rodny, in the struggle for power, that Yaropolk died at the hands of Volodymyr. Deforestation and plowing of mountain slopes contributed to active soil erosion, formation and growth of deep ravines.

In the early 1920s, researching Kaniv geological dislocations, geologist VV Riznichenko drew attention to the fact that the growth of ravines threatens even the graves of Taras Shevchenko. On July 27, 1923, the scientist made an "Initiative Note" to the Commission for Nature Protection of the Agricultural Scientific Committee of the People's

Commissariat of Land Affairs of Ukraine on the need to create a state reserve in the vicinity of Shevchenko's grave.

On July 30, 1923, the Board of the People's Commissariat of Land in Resolution №156 instructed the All-Ukrainian Forest Administration and the People's Commissariat of Education to consider the establishment of a reserve of 10 square meters. miles near the tomb of Taras Shevchenko. This date initiated the creation of the State Forest-Steppe Reserve named after T.G. Shevchenko.

Its creation took into account the wishes of not only archaeologists, geologists and biologists. In connection with the extraordinary transparency of the atmosphere in the Kaniv Mountains, the proposal of the director of the Odessa Observatory O.Ya. Orlov was considered. about the need to organize an observatory here. Geologists insisted on the establishment of a seismic station. So prominent scientists have developed a comprehensive model of the reserve. The estate of the reserve is the territory of the former dacha "Knyazha Hora" of the outstanding figure of Ukrainian culture, academician Mykola Fedotovych Bilyashivsky. During the organization of the reserve, out of 14 tithes belonging to the academician, 11 were taken under the reserve, and 3 were left to the scientist, considering his request and request of the Archaeological Committee at VUAN, which stated that MF Bilyashivsky was entrusted with close supervision and protection Slavic settlement, which is under the protection of the Committee and lies within the estate of the academician. [14]

Initially, the reserve included the grave of T.G. Shevchenko, but in 1925 Tarasova mountain with an area of 4 tithes was separated into the Historical and Cultural Reserve "Tomb of T.G. Shevchenko ». In a short time, the scientists carried out all the necessary preparatory work, the commission for the nationalization of land allocated the area of the reserve, and a draft resolution was submitted to the government. The People's Commissariat of Land delayed, without establishing the practical work of the Forest-Steppe Reserve, and continued to manage it from Kyiv and Kharkiv. From 1923 to 1930 the study of the reserve took place through the organization of scientific expeditions.

In June 1931, the People's Commissariat of Education handed over the Archaeological Reserve to the People's Commissariat of Lands with the condition of preserving historical monuments and giving archaeologists the opportunity to study them. Thus, not only the lands of the Forest-Steppe Reserve were returned, but also premises for administration and scientific laboratories appeared. Already in the early 1930s, the reserve had a scientific center, observations were made at two meteorological stations, a library and a museum began to form, and an apiary was established. In 1931 the reserve was studied by the

Complex Expedition of the All-Ukrainian Academy of Sciences under the leadership of M. Charlemagne.

The area of the reserve reached 1260 hectares. The result of scientific activity of the reserve in the 1930s was the publication by the People's Commissariat of Land of Ukraine in 1937 "Collection of works of the Middle Dnieper State Reserve" and entomologist Kryshchal OP. June 29, 1939 in accordance with the resolution of the Council of People's Commissars of the USSR Middle Dnieper Reserve transferred to Kyiv State University. T.G. Shevchenko to create a scientific-experimental and educational base on its territory.

In 1986, in accordance with the order of the Council of Ministers of the USSR №717-R of December 22, 1986, the lands of Zolotonosha forestry - 510 ha, Kaniv GLMS - 480 ha, state farm "Soviet Ukraine" - 4.3 ha, water areas were transferred to Kaniv State Reserve. Kremenchug reservoir - 20 hectares, in total - 1014.3 hectares. In 1987, the State Act on the Right to Use Land was approved, which included the newly annexed territories.

According to the decision of the executive committee of the Kaniv district council of people's deputies dated 25.08.87 at №176 around the tract "Snake Islands" the coastal protection zone of the 20-meter strip of the Kaniv reservoir was established. Around Fr. Shelestiv is a protected area with a total area of 20 hectares. Protection zone of Fr. Kruglyk (water area of Kremenchug reservoir) is 384 hectares. The total area of the reserve was 2026, 98 hectares.

The annual observations of the reserve's scientists are reflected in the "Chronicle of Nature", which has been kept since 1971. Since 1995, the scientific journal "Reserved Affairs in Ukraine" has been published (in the list of the Higher Attestation Commission - in biology and geography). 1992 - with the release of the Law of Ukraine "On Nature Reserves of Ukraine" (June 16, 1992) a new classification of nature reserves was introduced, according to which the Kaniv State Reserve became the Kaniv Nature Reserve.

By the Decree of the President of Ukraine № 2/2010 of January 1, 2010 "On the expansion of the territory of the Kaniv Nature Reserve" the territory increased by 6615.6 hectares of state-owned land.

The reserve is located in the central part of the forest-steppe zone on the right and left banks of the Dnieper. According to the physical-geographical zoning (Ecological Encyclopedia, 2007) its territory belongs to the Kyiv upland region of the Podilsko-Prydniprovsky forest-steppe region (the section of the right bank is known as "Kaniv Mountains") and the North Dnieper terrace lowland region of the Left-Bank-Dnieper forest). According to geobotanical zoning (National Atlas of Ukraine, 2008), the territory belongs to two districts (Northern Right-Bank-Dnieper hornbeam-oak, oak forests, steppe meadows, meadow steppes and Left-

Bank-Dnieper linden-oak, hornbeam-oak, pine) (on terraces). forests, meadows, halophytic and swamp vegetation) of the Eastern European forest-steppe province, Eurasian steppe region. The largest part of the territory is the "upland part", which is a heavily deployed and transformed by erosion 4th floodplain terrace (1415 ha). Less than 500 hectares are occupied by two floodplain islands (Kruglyk and Shelestiv).

A total of 116 hectares represent the left-bank pine terrace of the Dnieper - the tract "Snake Islands", located in the waters of the Kaniv Reservoir. The study of flora began before the creation of the reserve. The first information about the flora of this area is given in the works of OS Роговича, В.В. Montresora, N. Yanati. [15, 47, 48, 57, 60, 61].

995 species of vascular plants have been registered on the territory of the reserve. The most widely represented species in the Holarctic are the families of compositae and cereals (120 and 85 species, respectively). The third place in terms of richness of species belongs to the legume family (50), which is typical for most regions of the forest-steppe zone. [66, 68].

The following places are also occupied by families widely represented within the Holarctic: labiate (48), sedge (43), carnation (43), rosacea (42), morning (42), cabbage (41), umbrella (32). The richest in number of species of genera: sedge (29 species), Veronica (20), bitter gourd (15), foxglove (12), quince (11), bellflowers (11), cornflower (11), butterbur (10), butterbur), violet (10). Nine species are represented by genera: buttercup, sorrel, rank, snit, nechuy-wind, sitnik; eight species have: carnation, willow, forget-me-not, tonkonig, bonfire. According to the range of life forms, according to Raunkier, the flora is also quite typical for the regional flora of the forest zone. Hemicryptophytes (439 species) are best represented here. Therophytes, including biennials, are represented by 279 species; geophytes (together with hydrophytes) - 144 species; phanerophytes - 87 species; hamephytes - 24 species. Among the relics should be distinguished types of different ecological orientation, which, obviously, are different in chronological and florogenetic terms complexes.

Of these, the following are most clearly distinguished: - a group of relatively thermophilic, mesophilic, eutrophic sciophytes - species of deciduous forests with significant breaks in distribution (disjunctions of the area) - carniolian scopolia, Marshall's rust, spring morning, purple-purple egonikhon, purple-purple. They are mostly considered relics of warm geological periods, in particular the Dnieper-Valdai interglacial; - a group of psychrophilous species of forests and bogs of boreal type of distribution with places of growth near the southern boundary of the range in the Middle Dnieper Forest-Steppe - clownfish, small and round-leaved pears, marsh marigold, marsh specimens. It is likely that the optimum of their development in our area is associated with the era

of Valdai glaciation. There were 14 narrow-range species (excluding apomites), whose populations are confined to psammophilous habitats. Phylogenetically and areologically, most of them are related to the regions of Central Europe and the Mediterranean. In particular, these are Sarmatian subendems, such as the Sumy cornflower, the Dnieper cornflower, the false carnation, and the Ukrainian goatskin. Sandwort, cornflower yurinia, smooth-seeded minaret, Russian young, Chernyaev's yellow-grass, Dnieper yellow-grass, Eremogone luchnostepova, false Phrygian cornflower, Palas and Chernyaev's thyme have a wider range [57].

According to forest management, forest vegetation occupies 92.3% of the area (1870.4 ha). On more than a third of the forest areas of the Right Bank (636.3 ha) the predominant species is hornbeam. Pine plantations, mostly of artificial origin, are 237.7 hectares. They are represented in all these areas of the reserve. For the most part, on the steep slopes of the ravines of the "upland" part of the reserve, considerable areas (306.2 hectares) are occupied by artificial acacia plantations. Ordinary oak prevails on 246.1 hectares. The basis of the stand of floodplain forests is white willow, white and black poplar, rarely ash maple (193.4 ha).

Most of the other tree species that grow here (common oak, small-leaved linden, tall ash, cherry, hanging birch, smooth elm, rough elm) are found as assectators. Characteristic is the high participation in the stands of maple and field maples.

In some species, the last two species, sometimes with rough elm, form the basis of the undergrowth-undergrowth tier, where black elderberry, warty and European cowberry, as well as hazel, holly, Tatar maple, and false hawthorn are found as assectators.

In the grass layer with the participation from 1 to 5 points there are 187 species, which are divided into 9 phenorhythmic groups. With the onset of vegetation, the background is formed by ephemerooids and hemiephemerooids. The most common of these are dense and hollow ryasta, spring wheat, yellow anemone, yellow and small asterisks, snowdrop, yeast, five-leaf clover and tuber, musk adoxa. Winter-green hamephytes and hemicryptophytes, which are characterized by the highest indicators of projective cover, grow almost all year round. The most common among them are hairy sedge, European ungulate, yellow vegetable, urban gravity, fragrant butterbur, lanceolate aster, periwinkle, fragrant violet, deaf spotted nettle, male Dryopteris. Throughout the summer, the share of summer green hemicryptophytes and geophytes with early onset of development is high. These are, first of all, the common fir, the spring rank, the multi-flowered bush, the dioecious nettle, the perennial forest, the May lily of the valley. Individual plots of

the grass layer of the hornbeam forest have a well-defined low undergrowth of the already mentioned tree species.

In some years, due to various biocoenotic changes (eating the leaves of trees by caterpillars or soil pores by wild pigs), the participation in the grassland of representatives of the group of spring grasses and winter monocarpics increases significantly. The most common are small-flowered small-flowered, rare-flowered strophostoma, birch-shaped bitter, sandy cardaminopsis, sticky butterbur, and intoxicating butene. In some places, the participation of late vegetating grasses (forest purslane, bellflower, knotweed, hellebore, meadow horsetail) and cereals with an indefinite rhythm of leaf regrowth (buckthorn, fine-leaved oak) is stable, but low.

Acacias on well-drained and warmed southern slopes and on the tops of hills with skeletal soils have a sparse grass layer with high constancy of species such as creeping wheatgrass, intermediate wheatgrass, roof aniseed, thin-leaved butterbur, and blackthorn. In the thalwegs of ravines and on the bottoms of beams in places with constant excessive moisture there are fragments of groups of coastal-aquatic vegetation with dominance of narrow-leaved cattails, moist alder forests, and in the sprung areas of Within the estate of the reserve (area about 5 hectares) and on the site of the former arboretum, the growth of more than a hundred species of exotic trees was noted, most of which should be classified as colonophytes. Within the estate and on forest roads, groups of synanthropic grassy vegetation are also fragmented.

The natural complexes of the first floodplain (pine) terrace are presented on the territory of the "Snake Islands" tract. The highest elevations here are 115–120 m. The basis is made of sod-podzolic soils, various variants of soils of hydromorphic type meet less often. Forest vegetation predominates. The main stand is oak, sometimes with pine. In some areas there is also a lot of birch, aspen, linden.

The highest parts of the profile, represented by small fragments, are occupied by pure pines with a weak undergrowth of low-growing oak and cowberry, where long-rhizomatous and soddy grasses and sedges (marten The well-preserved fragments of these forests are characterized by high constancy of typical heliophilic psammophytes, nodular-meadow and meadow-steppe species, in particular, black-leaved and broad-leaved grass, medicinal swallowtail, alpine clover, May lily of the valley, eaglet, fragrant bush, goldenrod, true butterbur, mountain smelt, common strawberries [59].

The more advanced stages of the swamp-making process are represented by fragments of shrub communities, where in the grass layer, in addition to the above-mentioned, the marsh telipteris, the female helminth, the comfrey, and the European wolfhound grow. Black alder trees are found only occasionally.

The character of the coastal zone of the Kaniv Reservoir differs little from the coast of the floodplain islands of Kruglyk and Shelestiv, where in the stagnant waters of the old lakes groups are formed with the dominance of duckweed, crested, Elodea Canadian, sea urchin. In the late summer and autumn border periods on the low floodplain released from the water, large areas are occupied by groups, where creeping panicles, needleweed, brown buckthorn, Russian dried flower, water mullet, dichostilis hooked and Mikel, wolf, are often found. Large areas on the low floodplain are occupied by groups of coastal and aquatic vegetation.

In addition to those listed for the pine terrace, on the floodplain in the role of dominants are found tonkonig bog, kuga, tsitsaniya deciduous, calamus, lopeshnyak large, plakun verbalisty, arrow-leaf, leersia rice-shaped. The forestless areas of the central part of the floodplain of different hypsometric levels are occupied by different variants of primary meadows, which represent the middle stages of floodplain vegetation development.

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Strips along the shores of the inner island straits and lakes, where due to slowing down the accumulation of silt deposits, the most common groups, dominated by tall hygro- and hydrophytes: common willowherb, tall wolfhound, willow and twigs, , sneeze verbalista.

The plains of the central part of the floodplain islands, which are regularly but not temporarily flooded by flood waters, are occupied by meadows, which are characterized by frequent periodic or annual replacements of aspect-forming and dominant species of meadow foxtail, creeping wheatgrass, marsh grasshopper, fragrant, avran medicinal.

A slightly higher level of this type of surface, due to the overregulation of the flow of the Dnieper River only in some years flooded by flooding, is occupied by peculiar Meadows. They, in connection with this hydraulic mode, are characterized by sharp changes in the role of ecologically different species (fluctuations) and in different years the role of dominants can be in played by different species.

For the period of years with no flooding, the becker's fire most often dominates. After its extinction as a result of flooding for several years, there is a change in the dominance of such species as clover doubtful, vetch four-seeded, stonecrop, sedge early. The highest levels of young

floodplain (above 82 m above sea level) with unformed drying soils that are not flooded by floods are occupied by groups of background species, which include husk, rye, agalic, mountain grass, stonecrops, caustic and six-row, sorrel rowan, celery blueberry, fire becker. The surfaces of the next stage of floodplain vegetation development (formed floodplain) are floodplain forests. Their wettest version is raw and wet forests with a stand of white willow. There is no undergrowth, and the background species of the grass layer are forget-me-not, marsh butterbur, marsh butterbur, herd of deciduous trees, leersia. The middle altitude of the floodplain, which is regularly flooded only during floods, is represented by forest and shrub communities, where, in addition to willow in the stand, a significant proportion are white and black poplars, sometimes rough elm, black mulberry, maple. A distinctive feature of the structure of these forests is a well-formed undergrowth-shrub layer of amorphous shrub, buckthorn, ragweed, blackberry. Mesophilic-nitrophilic species such as butterbur, nettle, celandine, ivy, and kirkazon often grow in the grass layer. The highest level of the surface of the formed non-flooded floodplain is occupied by sparse forests of black or pine poplar and artificial pine plantations.

These groups are characterized by the presence of xeromesophilic shrubs (Tatar maple, false hawthorn, dog rose) and meadow and meadow-steppe grasses (nightshade, early sedge, tonkonig narrow-leaved, mykolaychyky plain, stokolos).

The importance of the Kaniv Nature Reserve for the protection and preservation of the natural complex of the Middle Dnieper is determined by: - the representation of typical for the region, zonal deciduous forests, which reduce their distribution in connection with current forestry methods: hornbeam-oak forests on the area of 670 hectares in the right-bank part of the reserve, oak forests of Tatar maple and hazel on the area of 71.9 hectares in the tract "Snake Islands"; - protection of groups listed in the Green Book of Ukraine (2009): fragments of common oak forests dominated by carniolian scopolia, common oak forests dominated by bearish grass, white water lilies, Dnieper feather grass, floating water nutmeg, floating hazelnut; - conservation of the habitat types important for the maintenance of the biogeocenotic diversity of the region to be protected in accordance with the revised Annex I to Resolution 4 (since 1996) of the Berne Convention, in particular:

C1.22 - free-floating vegetation of mesotrophic reservoirs with a predominance of common frogweed, aloe vera cut, floating salvinia,

C1.34 rooted-floating vegetation of eumesotrophic reservoirs dominated by water buckthorn,

C3.41 Euro-Siberian groups of coastal aquatic vegetation with sedges, reeds, cattails, plague, etc.,

C3.51 of Euro-Siberian groups of short juveniles on periodically flooded coasts with dominance of water mullet, amphibian water horseradish, needle minnow,

E 1.1 open areas with drought-tolerant psammophilous vegetation dominated by Dnieper feathergrass, young Russian,

E 3.4 fresh and moist mesotrophic onions with a predominance of meadow foxtail, meadow foxtail, early sedge, ground marten, creeping wheatgrass,

E5.4 wet and wet high-grass onions dominated by marshmallow, viper,

G1.11 coastal floodplain forests dominated by white willow, black and white poplar,

G1.A1,4 deciduous forests in power areas with mesotrophic and eutrophic soils,

G3.4232 Sarmatian pine forests with steppe grasses; - the actual and probable localization of populations of protected plant species in this area.

In particular, these are 27 species of vascular plants listed in the Red Book of Ukraine: long-leaved buckthorn (ten local populations with single shoots, in the ridges of the right bank), red buckthorn (the only generative shoot in the hornbeam forest in 1980), floating water nut (first noted 32 specimens of the plant in the summer of 2009 in the bay on the southwest coast of the Snake Islands), nesting common (more than 60 local populations in the ridges of the right bank), crescent clusters (there were two growth sites in the ridges of the right bank and one on the Snake Islands), (found in the only place of growth discovered by I. Parnikoza in 2002), Lezel fat (known from the only place of growth in the vicinity of the tract "Snake Islands"), marsh cuckoo (three places of growth in low-flood meadows Kruglyk and Shelestiv), cuckoo cuckoo (three its places of growth are confined to the meadows of the middle level of floodplain Shelestov Island), cuckoo's tears are ovoid (several dozen generative and vegetative shoots grow on the dam leading to the Snake Islands), hairy feathers (indicated for many parts of the Right Bank), Dnieper feather grass (groups with co-dominance of this species are found on the island of Shelestov and Snake Islands), marsh marigold (grows on the dam leading to the Snake Islands), hellebore (several dozen local populations in the forest of the right bank and oak-pine forests in Snake Islands "), lyubka dvolis-Skopolia carnioliyska and (distributed like a hellebore), lyubka zelenotsvita (in 2007 the only flowering shoot in the Snake Islands was discovered), palchatokorinnik meat-red (several tens of individuals are observed annually in the bushes and some individuals found in the wet meadows of Kruglyk Island), snowdrop (grows in eight artificially reproduced coenopopulations in deciduous deciduous massifs), Siberian roosters

(occasionally isolated curtains in the thickets of shrubs on the islands Kruglyk and Sheleshy, as well as coast in the tract "Snake Islands"), plaun sheep (two small chickens of this plaun were observed in the Snake Islands), spring morning (some individuals were found in a single place of growth in the hornbeam forest), floating salvinia (found in standing waters of floodplain islands and Snake Islands), Carniolan scopolia two local populations in the ridges of the reserve), blackening sleep (found everywhere in pine and pine-oak forests, forest edges and meadows on the Snake Islands), broadleaf sleep (occurs less frequently than the previous species in similar phytocenoses of the Snake Islands), onion in bearberry tier of ridges on areas of more than a hundred hectares along the thalwegs of ravines), the rank of speckled (occurs singly and in groups in more than 50 places of growth in the ridges of the reserve). [8]

In addition to these Red Book species that grow in natural phytocenoses, the estate cultivates 14 species included in this list. These are multi-colored brandy, low cowberry, spring white flower, Eastern Carpathian lilac, Odessa bare-seeded, spring mustard, forest lily, folded snowdrop, thin-leaved peony, yew berry, oak tulip, saffron net, Heifel saffron.

Of the species offered for protection under Annex 1 of the Berne Convention, 9 grow here. along the edges of pine-oak forests and sandy steppes on the Snake Islands), marsh queen (there are single individuals in swampy depressions along the coast of the Snake Islands), cornflower (grows in the number of several hundred individuals on the edges of the Snake Islands).

Within the reserve there are also 4 species listed in the European Red List. In particular, Dnieper yellow-grass (relatively common in psammophilous groups on the floodplain and pine terrace, Ukrainian goatweed (common as in the previous species), Ukrainian sorrel (observed in low-flood wet meadows of Kruglyk Island)), violet Lavrenko (pointed at on the basis of the meeting of Bortnyak MM).

Mycological research on the territory of Kaniv Nature Reserve has been going on for more than 70 years. Due to long-term monitoring carried out here by many well-known mycologists, the reserve in Ukraine is considered the most studied in terms of mycology. Data on fungi of this protected area are reflected in more than 100 publications and in 44 books of the Nature Chronicles of the reserve.

Fragmentary research on mycobiota began in 1939, when the reserve was transferred to Kyiv State University. T.G. Shevchenko. The first mycological meetings were held here by employees and students of the Department of Lower Plants of the University, employees of the Institute of Botany of the USSR Academy of Sciences and other scientific institutions. Purposeful studies of fungi became only in the summer of

1944, and acquired a systematic character with the establishment of a scientific department in the reserve in 1969.

There are almost 1261 species of fungi and mushroom-like organisms in the Kaniv Nature Reserve, which belong to three kingdoms: Protozoa, Chromista and Fungi. The group of fungal organisms, which includes representatives of the first two kingdoms (Protozoa and Chromista), is represented in the reserve by 58 species from the divisions of Myxomycota and Oomycota. True fungi (the kingdom of Fungi) include representatives of the divisions Chytridomycota, Zygomycota, Ascomycota, basidiomycota and a formal group of anamorphic (mitosporous, incomplete) fungi. A total of 1203 taxa of true fungi were found in the study area.

Most of the species recorded in the reserve are common, common in other regions. However, about 20% of the species are rare in Ukraine, known in Ukraine from only 2-3 locations or those that occur among the reserves of the Right Bank of Ukraine only in the Kaniv Reserve. Three species - *Eutypella ventricosa* (Fuskel) sacc. And *Giberella maxima* smyk on *Carpinus betulus* L., as well as *Tympanis ligustri* Tul. On *Ligustrum vulgare* L. attract special attention because occur in Ukraine only in the Kaniv Nature Reserve.

9 species of macromycetes listed in the Red Book of Ukraine are successfully protected here: *Galeropsis desertorum* Velen. Et Dvor., *Hericium coralloides* (scop.) Pers., And *Morchella crassipes* (Vent. .), steppe wrinkle (*Morchella stepicola* Zerova), *Clavariadelphus pistillaris* (L.) Donk, *Mutinus caninus* (Vent.) Pers.), *Amanita echinocephala* Vittad. (*Amanita* F *solitaria* bull. .]), Slonevsky's line (*Gyromitra slonevskii* Heluta), polypil *umbellatus* (Pers. ex Fr.) bond. et sing. [*Polyporus umbellatus* (Pers.) Fr .; *Grifola umbellata* (Pers.) Pilat]). It should be noted that the most common in the reserve, in particular in its upland part, there are polypil umbrella, dog mutin and Slonevsky stitch, other species in recent years have not been observed at all. Growing in small numbers in the reserve and regionally rare species - late inocibe (*inocybe serotina* Peck), lentin tiger (*Lentinus tigrinus* (Fr.) Fr.), *Montagnea candollei* Fr. (*Montagnea candollei* Fr.), *Pseudocorreus*) Corner), bruised granate (*boletus erythropus* (Fr. ex Fr.) secr.), Lacquered lacquer (*Ganoderma lucidum* (Fr.) P. Karst.) And phallus Hadrin (*Phallus hadriani* Vent.).

Long-term mycological monitoring makes it possible to detect changes in the biota of fungi and to trace the dynamics of development of individual species (including rare ones) and to plan comprehensive research.

Currently, 53 species have been registered in the mammal fauna of the Kaniv Nature Reserve (Ruzhilenko, 2008). The largest number of species are rodents (19), carnivores (12) and bats (9). The difference in

relief, soils and vegetation in the three separate areas of the reserve explain the uniqueness of the complexes of mammals that live on them.

On the right-bank (upland) part of the Kaniv Reserve, forest mammals predominate, on floodplain islands - wetlands, and on the Snake Islands - forest and wetlands.

On the right-bank territory of the reserve 5 species of ratites are registered: elk, red deer, spotted deer, roe deer and wild boar. Of these, the last two species are background.

Predatory mammals are represented on the right bank of the reserve by 10 species. Common in forests are the common fox, the forest marten, the badger, and on the reserve estate - the stone marten.

Less numerous species are the weasel, ermine, raccoon dog. The wolf in the number of 1-2 people was registered annually in the 80s - 90s of the last century. Currently, wolf activities on the right bank of the reserve are much less frequent.

A very rare species has been the ferret, which has been displaced from its habitat by the stone marten.

The American mink was registered on the right bank of the reserve only during the period of migrations from the old Ros River in the direction of the Kaniv Reservoir in the 80s and 90s of the last century.

On the right-bank part of the reserve there are 8 species of bats. The background species is the Natusius bat (forest bat).

Less numerous are the common bat (small bat) and the Natterer's nightingale (ciliated nightingale). Individual colonies in hollow trees are created by a red party. On the estate in wooden buildings and in hollows of trees live brown ears, late bats. A small species on the estate of the reserve is a two-colored lily. In the vertical cracks of the steep walls of the ravines were found in the winter European broadleaf.

11 species of rodents have been registered on the right-bank territory of the reserve. In hornbeam oak background species are three species of murine rodents: red fistula, yellow-throated mouse and underground fistula. Field mice were seldom caught in maples. The forest mouse lives mainly in meadow-steppe areas. Here, too, the field mouse predominates in number.

In some years, its subdominant is the common fistula. In the meadow-steppe areas and less often on the estate of the reserve there are nests of baby mice. Water fistula was occasionally recorded in ravines near water bodies. Domestic mice and rats live permanently in the buildings on the reserve's estate. Mounds of the Kurgan mouse can be seen in the fall on garden plots on the estate of the reserve.

Squirrel is common on the estate of the reserve and in forest stands is a common species, but it settles throughout the territory in fragments. Among wolves, the gray wolf and the forest wolf are more common. Gray wolves were more often found on the estate of the

reserve, in gardens, as well as in the middle of the forest at the forest border. The wood wolf, as well as rather rare nut wolf, mainly settle in woods. Insectivorous mammals are represented by 6 species. The white-bellied hedgehog is more often registered on the edge of the forest near the Dnieper. European mole is a common species in both forests and open areas.

In forests and shrubs, the dominant species among woodpeckers is the common woodpecker, and in meadow-steppe areas - the woodpecker is small. White-toothed and white-bellied were occasionally registered at the reserve's estate. The hare is a common species in all habitats of the upland part of the reserve. During the years of declining numbers, its traces were more often registered on the outskirts and estates of the reserve. In the Snake Islands, ratites are represented by 4 species. Of these, European roe deer and wild boar live permanently. Occasionally moose and red deer come.

Predatory mammals in the Snake Islands have 9 species. Common species here are the common fox, raccoon dog, forest marten, badger, river otter, in some years - the American mink. Weasel and ermine and ferret are rare species. Bats on the Snake Islands are represented by 4 species. In the hollows of trees live a small bat, Natusius bat, water nightingale. A red partridge hunts over the islands. The hare is a common species in the Snake Islands. Among murine rodents (7 species) on these islands are dominated by yellow-throated mouse, red fistula. Less common are field mouse, forest mouse, common fistula. Traces of water fistula can rarely be seen along the coastline. In the building of the forest border, a house mouse lives permanently. Only twice in the forests of the island were recorded traces of temporary stay of the common squirrel. The forest wolf is often found in forest plantations.

River beaver in modern times is a numerous species on the islands. Most of this rodent lives in burrows. In one case, near the inner bay, a beaver created a low hut out of branches. The muskrat is a rare species here. Insectivores in the Snake Islands are represented by 1 species - the European mole.

5 species of ratites have been registered on the floodplain islands of Kruglyk and Shelestiv. The background is the European roe deer and wild boar. Almost every year there are events on the islands of red deer and elk. Occasionally spotted deer come to these islands.

Among predatory mammals, 9 species have been registered in the protected floodplain. The background species is a raccoon dog. Slightly fewer foxes and river otters are registered on the islands. A few are ermine, American mink, badger, a rare species - weasel and ferret. The common fox mostly moves to the floodplain islands from the old Russia in late summer and autumn, where it stays throughout the winter.

Individual foxes live permanently on the islands, and in some years produce offspring. Most individuals of the river otter migrate to the floodplain islands of the reserve in the spring and autumn.

In some years, a wolf enters the island of Shelestov. The bat fauna has 6 species on the floodplain islands. Inland waterfowl often hunt over inland waters.

In the hollows of sedges and willows live two species of bats (Natusius bat and common bat), red partridge, earwigs. In a single case, the stay of Natterer's nightgown was registered here.

Rodents on floodplain islands are represented by 8 species. Background species in shellfish are field mouse, common fistula. In addition to the field mouse, the wood mouse and the red fistula live in the thickets of shrubs and in fragmentary areas of floodplain forests. The yellow-throated mouse is a rather rare species. Occasionally along the coast you can find traces of water fistula.

River beaver on the floodplain is a numerous species. Everywhere on the islands, beavers dig burrows in the shores. Muskrat is rare. The hare has become rare in the last decade on the islands. In some years it was not registered here. Insectivores are represented by 3 species. In moist meadow areas and in places of growth of tree and shrub vegetation, the common woodpecker dominates, and in the open areas in the shelly fields, the woodpecker is small. Kutora common is a small species in inland waters. In the fauna of amphibians and reptiles of the Kaniv Reserve there are, respectively, 11 and 8 species (Ruzhilenko, 1998; Zinenko, Ruzhilenko, 2003). [8] In spring, grass frogs are found in water bodies, and in summer and autumn in forests, and gray, garlic, pond and lake frogs are more common along the Dnieper coastline. Occasionally on the inland waters of the reserve you can see a spring. Kvaksha according to the cries of males was observed in forest plantations and on the estate of the reserve.

In the same habitats recorded and newt comb. Common newt is rare in the reserve. This species was observed during spawning in shallow water near the village. Bakers. Obviously, individuals of this species penetrate into the adjacent forests of the reserve for the winter. In the right bank of the reserve, the green frog has become a very rare species over the past few decades. Among reptiles in meadow-steppe areas, on the estate of the reserve and along the Dnieper, the green lizard is often registered. The agile lizard is a rare species. The spindle tree is found in fragments both in forest plantations and on the estate of the reserve. Near reservoirs and along the bank of the Dnieper, the common view is a common snake. Viper Nikolsky is found in the middle of forest glades and on the estate of the reserve. The common viper is registered mainly on the reserve estate and in the meadow-steppe areas. Medyanka was registered in separate biotopes in the middle of

forest plantations, on meadow-steppe areas and on the reserve estate. The marsh turtle was observed on the inland waters of the right-bank part of the reserve. In the Snake Islands, the most numerous species among amphibians are pond, sharp-nosed, garlic and lake frogs and spring frogs, rarely seen quacks. Of the reptiles, the common snake, the common viper, the agile lizard, the warbler, and the marsh turtle live here. The avifauna of the Kaniv Nature Reserve has 234 species. They belong to 18 families and 51 families. This is more than half of the bird fauna of Ukraine. 97 species of birds nest in the reserve, 10 nested earlier (of which 2 species ceased to occur at all - owl and barn owl), 26 nest in the vicinity of the reserve and are found in its territory, 83 species are migratory and wintering, 18 - migratory. [10]

38 species of birds recorded in the Kaniv Reserve are listed in the Red Data Book of Ukraine (2009). Of these, 3 nest - white-tailed eagle, black snipe and sandpiper, 2 nest near the reserve - small tern and blue pigeon, 20 - are regularly found during migration and wintering. 4 species are globally endangered, two of them nest - white-tailed eagle and woodpecker. According to the classification of species of European conservation significance (sPEC), 72 representatives of the avifauna of the Kaniv Reserve have an unfavorable conservation status (categories 1 - 3). According to the European threat categories, 3 species are endangered, 31 are vulnerable, 8 are rare, 2 are localized, and the number of 27 species is declining. 206 species of birds of the reserve are under the protection of the Bern Convention, 101 - Bonn, 39 - Washington (CiTEs). According to the method of nesting, 24 species of modern nesting ornithofauna belong to terrestrial nesting, 20 - to trunk-shrub, 18 - to hollow-nests and chronicles, 8 - synanthropic species that nest on the reserve, 4 - suspension-nesting, 3 - diving folds of vegetation. In the forests of the highlands and the Snake Islands, the most common species of birds is the finch. This is generally the most numerous bird of the reserve. In the hornbeam oak, the population density of finches reaches 100 - 150 pairs per square kilometer.

The second largest species - raspberry, or alder. Common forest birds are the great tit, the small and white-throated flycatcher, the black and song thrush, the black-headed urticaria, the bone-grinder, and three species of sheepdogs - the yellow-brow, the spring, the blackbird. Less numerous blue tit, nut, oriole, nuthatch, click. In the pine forest you can see a crested tit. Common oatmeal and wood lark nest on the edges, less often - wood lark. On the floodplain islands of Kruglyk and Shelestiv, there are mass species of rowan birds: shrike, gray and garden urticaria, and shepherd. Orioles love wet floodplain forests. In the bushes you can find a nest- "glove" remeza. Of the woodpeckers in the reserve, the largest is the large variegated, there are also gray, small and medium variegated, there are several pairs of black - the largest of our

woodpeckers. The Syrian woodpecker is seldom found on the estate, it is a bird of settlements. On the island of Kruglik in a flooded forest is a colony of gray herons. In 1975 there were already about 50 nests of gray herons and about 10 nests of quack, in 1979 - respectively 90 and 20. Over the past 20 years, the number of nests of gray herons in the colony has varied significantly over the years - from 100 to 300. But quack stopped nesting at all. A large cormorant nests on Kruglik together with herons. These birds first appeared in nesting grounds in 1999, with 11 nests in the colony. The number of cormorants grew rapidly, in 2012 780 pairs were already nesting on Kruglyk. Cormorants nest together with the gray heron, but occupy the main part of the colony, pushing the heron to the periphery. The Great Cormorant on the Dnieper near Kaniv has now become a background species. In spring, these birds are among the first to arrive, in autumn they are delayed until November and even the first half of December. Cases of wintering of cormorants were already noted. Among the birds of prey in the forests of the reserve, the most numerous are the great hawk and the buzzard. Several pairs of these birds nest every year. On the islands of the reserve there is a black shulika. Earlier 3-4 pairs nested here, now there are only 1-2. Once a common type of floodplain in many places has become a rarity. During the last 20 years, a dwarf eagle has been repeatedly encountered on the territory of the reserve in the summer, although its nesting has not been established here.

One of the most interesting birds of the reserve is the white-tailed eagle. It can be seen on the Dnieper. This is a rare species listed in the Red Book of Ukraine. Its total number in Ukraine is about 100-120 pairs, most of them nest on the Dnieper. In some years, up to 20-30 birds are kept in the area of the reserve during the winter. In spring and autumn you can meet migratory groups of eagles, they also stop at protected islands. In summer, there are single stray birds that do not breed.

During the spring and autumn flights on the Dnieper you can see our second rare fish-eating predator - osprey. It is easily recognizable by its characteristic black and white color. The most common osprey occurs in April and August-September, there were meetings of these birds in the summer. During migration, you can find other rare birds of prey - snake, kite, falcon, bald eagle, dwarf eagle. Black storks appear regularly in flight, especially in autumn, there were meetings of stray birds in the summer. The autumn flight of the black stork takes place in August-September. At this time on the islands for him very favorable conditions. The water level in the Dnieper decreases at the end of summer, and large spit and shallows appear.

In such places it is convenient to catch small fish, which is the basis of nutrition of black storks. In addition, after the next discharge of hydroelectric water, there are many small lakes and puddles on the

sandy spit, where the fish becomes easy prey. Herons, martins, terns and crows are constantly hunted in such places. As a rule, black storks are kept alone or in small groups, but there were also flocks of 10-15 birds. In years with high water levels, black storks on the islands almost do not stop. Owls in the reserve are now represented by only two species. In the upland part is quite numerous gray owl. The loud long mating cry of these birds can be heard sometimes in February. The gray owl nests in hollows, willingly occupies artificial nests. The barn owl is more common in the floodplain. She does not arrange nests herself, but usually occupies old buildings of crows. Earlier in the Kaniv Reserve an owl nested on the cliffs of remote ravines, but after 1973 it was no longer observed nesting. The house owl, once an ordinary bird of settlements, has also completely disappeared. Back in the 1970s, 1-2 pairs nested on the estate of the reserve. In addition to these species, the flight is occasionally found and the barn owl. From July, and sometimes June (it depends on the water level in the Dnieper), on large sandy and muddy shoals between the islands of Kruglik and Shelestov, clusters of waders are formed. On some days you can count on 100 - 200 birds. The species composition of such clusters is very diverse, it is constantly changing as the departure of some species and the appearance of others from the north. In summer, on the shoals, numerous herbivores, large grasshoppers, sandpipers, magpies, you can see forest growers and carriers. Later, large, swampy, black wells, and ties appear. You can meet guests from the far north - small, black-breasted, red-breasted and swampy coasts. Snipes and seagulls occur until late autumn. In winter, there are few birds in the forests of the reserve. They are revived by flocks of wintering species. Tits mate with other wintering birds and explore the treetops together for food. The basis of such flocks are large and blue tits, along with them are kept nuts, nuthatches, bark beetles, and often woodpeckers. Flocks of bullfinches, snipe, taps feed on weeds, choosing seeds. Flocks of wasps can be found where there are many mistles. On the edges and in the floodplain from October to April there is a gray shrike. No more than a few individuals spend the winter in the area of the reserve. Of the predators to replace our buzzard from the north arrives his close relative - winter.

The avifauna of the Kaniv Reserve and its environs has undergone significant changes after the commissioning of the Kaniv HPP. The first unit was launched in 1972, the station reached its design capacity in 1975. The floodplain and part of the pine terrace above the dam were flooded, including the once protected island of Zarichchya. As the hydropower plant operates in peak mode, there were significant fluctuations in the water level in the lower reaches - up to 1-2 m during the day. That is, below the dam there was a tidal regime, as at sea. Birds nesting in the coastal strip have suffered the most. Many nests of ducks,

terns, martins, waders died due to flooding. On the sandy spit Fr. Kruglik had two large colonies, in which river and small terns and the common martin nested. But since 1973, these birds have stopped nesting here. Their colonies, well below the hydroelectric dam, disappeared altogether and reappeared in areas not flooded, a concrete breakwater near the sluice and islands off the reservoir coast. Below hydroelectric power plants, terns now nest irregularly only in some elevated places, and not always successfully. This was the case, for example, in 2008, when dozens of tern nests on a dredged spit died due to a sudden significant rise in water level. A similar situation with the sandpiper, which stopped nesting on sandy spit. The flooding of a large part of the riverbed and the regulation of runoff, as a result of which the normal dynamics of the islands were disrupted, led to the fact that the deposits in the Dnieper region have practically disappeared. This bird nested on young sandy islands, which have just begun to overgrow. Back in the early 1950s, flocks of 10–12 birds were observed on Kruglyk. Both of these species are in the Red Book of Ukraine. However, not for all birds the appearance of Kaniv HPP brought only negative changes.

Due to the constant changes in the water level on the islands of the Dnieper in the lower reaches from mid-summer, favorable conditions are created for many fish-eating species. At this time, the water level begins to fall, near the shores are formed large sandy spit and shoals, which are flooded twice a day. After another drop in water, there are a large number of shallow channels, lakes and puddles, where it is very convenient to hunt small fish and other aquatic animals. From the second half of July, large clusters of herons, waders, martins, and terns are formed on spit and shoals. The most convenient places for rest and feeding of these birds between the islands of Kruglik and Shelestov and in the shallow bay of Kruglik. At the largest water drop, sandy and silty areas up to 30-40 hectares are exposed here. At high water levels, the area of shallow water is insignificant, so the birds are kept here much less.

In winter, thanks to the operation of hydroelectric power plants on the Dnieper near the Kaniv Reserve, there is always a section of open water. Its length depends on weather conditions, but even in severe frosts the ice breaks at a distance of 10 - 15 km from the dam. Waterfowl and amphibians spend the winter here every year. The most numerous mallards, great crested grebe, gogol. The white-tailed eagle is constantly found. In total, two dozen species of birds have been registered here during the winter. From invertebrates the fauna of millipedes diplopods and chilopods of the reserve is well studied. Representatives of the class of bipeds, together with earthworms, play a crucial role in the destruction of forest litter and soil formation, able to accumulate radionuclides in the body and withstand enormous doses of radiation. They are the only ones

in the animal world who have the ability to return from adulthood to juvenile (child) during molting and, thus, to experience adverse conditions, doubling the length of their lives (the so-called phenomenon of periodomorphosis).

During the whole more than 60-year period of studying the myriapods of the Kaniv Reserve, 32 species of diplopods were recorded on its territory, 8 of them: 8 - very rare and rare for the reserve, including 1 species of *Polydesmus montanus ukrainicus* Lohm. - listed in the Red Book of Ukraine. The fauna of labiped centipedes includes 27 species, including 10 rare and very rare for the reserve.

The world of insects in the reserve has more than 7,000 species. Hundreds of works of scientists are devoted to the inventory of protected entomofauna, to the study of biology and ecology of separate groups. The main part of this work was performed by representatives of the scientific school of prof. Krushtalya O.P. In particular, the aphids of the reserve were studied by Mamontova V.O., wire beetles Dolin V.G., beetles of families of leaf-eaters and weevils Globova N. D., beetles Petrusenko O. A., predatory water beetles Bilyashivsky M. M. ., bark beetles Pavlenko O. M., pollinators Ermolenko V. M., bee Osychnyuk G. Z., chalcid Zerova M. D. Long-term monitoring of scale insects was carried out by Klyuchko Z. F. and Frantsevich L. I. [10].

As a result of the research, 36 rare species of insects listed in the Red Book of Ukraine were noted. These are grandmothers: a beautiful virgin and a watchman-emperor; orthoptera: forest sawtail, steppe tail, steppe grasshopper; beetles: fragrant beetle, hermit beetle, deer beetle, great oak mustache, alpine mustache, Keller's red-winged mustache, crusader earth mustache, musk mustache, flattened blacksmith; butterflies: mahogany, podalirium, polyxena, mnemosyne, iris large, braznik dead head, posepina braznik, saturnia large, saturnia ore, birch endromis, blue ribbon, crimson ribbon ribbon, luxurious scoop, big paint, hostess; membranous: *Abia* brilliant, *Scolia*-giant, common xylocope, purple xylocope, mossy bumblebee; biplanes: ktenophora decorated, giant ktyr.

In the field of acarology in the reserve worked Shcherbak G.Y. (gamma mites), Akimov I. A. (fauna and ecology of tetrakhin mites), etc. The main difficulties in complying with the norms of the reserve regime in the reserve are related to the location of its territory in the vicinity of the 30,000-strong city and its proximity to Tarasova Gora, one of the most visited historical and cultural sites in Cherkasy region.

To reduce the negative impact of visitors on natural objects in the vicinity of the reserve estate, two ecological trails have been laid for nature excursions. Significant problems in the protection of natural-territorial complexes of individual territories are: the impact of the Kaniv HPP on floodplains, namely the unnatural nature of channel processes

and water discharge regime; high-intensity abrasion-accumulation process along the coast of the Snake Islands and digression-demutation changes in vegetation in low-lying areas caused by flooding by filtration waters of the Kaniv Reservoir; determined by the growth of alien species (amorphous shrub and maple) unnatural and anomalous state of certain types of phytocenoses of the floodplain, representing an uncertain in duration and general ecological essence stage of development of phytocenoses of the floodplain. [10].

Beloozersky National Nature Park

NPP "Biloozersky" was created by the decree of the President of Ukraine №1048 / 2009 from 11.12. 2009. The total area is 7016 hectares. The park includes the lands of the State Organization of Forestry "Biloozerske", with an area of 3660 hectares, located in Pereyaslav-Khmelnytsky district of Kyiv region, and Lipyava forest dacha, with an area of 3356 hectares, located in Kaniv district of Cherkasy region.

The need to create this nature reserve fund on the border of the two regions is determined by the fact that this area is a unique forest with typical for segments of pine and forest terraces of the forest-steppe left bank, once quite common forests, which are now almost completely destroyed in within this part of the Dnieper. In addition, there are a number of wildlife sites that must be protected in accordance with the current laws of Ukraine and environmental commitments made by Ukraine to the international community. Currently, it is the only protected area in the Left Bank of the Forest-Steppe, which determines the rank of a national nature park.

According to the physical and geographical zoning, the territory belongs to the North Dnieper terraced lowland region, the Left Bank-Dnieper forest-steppe region of the Forest-steppe zone (Ekol. Encyclopedia, 2007). According to the geobotanical zoning of Ukraine in 1977 and supplemented by Ya.P. Didukh and Yu.R. Shelyag-Sosonko, it is located in the southwestern part of the Left Bank Dnieper district linden-oak, hornbeam-oak, pine (on terraces) forests, meadows, halophilous and swamp vegetation (on the border with the Northern Right-Bank Dnieper district hornbeam-oak, oak, oak) meadow steppes) of the Ukrainian forest-steppe sub-province of the Eastern European forest-steppe province of oak forests, steppe meadows and meadow steppes of the Eurasian steppe region of the Holarctic Dominion.

Geomorphologically, the territory of the park is located within the second floodplain terrace of the Dnieper and its slope to the first floodplain (pine) terrace, including fragments of the latter. The general profile in the east-west direction shows the character of a gradual ascent to the central part of the park and a gentle slope in the east, or an

elongated shaft-like rise in the meridional direction. Its surface is everywhere complicated by a large number of local rises and falls. Absolute elevations of most areas range from 100 to 140 m.

Most of the small local elevations within the surfaces up to 130, and especially up to 120 m above sea level. g. m., are sand hills of ancient Aeolian origin, indicating the activity of the Aeolian process in the recent past. These formative processes should obviously be associated with the end of the Valdai or Wurm (30-15 thousand years). The most elevated part of the territory (absolute mark 155 m above sea level), or the so-called Khotkivsky hill, located 6 km southwest of the village of Khotsky, rises above the level of the Dnieper more than 70 m. Such surface fluctuations within insignificant distances in the literature are explained by neotectonic movements.

Soil cover is determined primarily by the nature of vegetation. Here in most areas under pine and mixed forests are dominated by sod-slightly podzolic and sod-podzolic soils, under the massifs of deciduous forests there are gray forest, and in places of depressions with excessive moisture are formed various hydromorphic differences .. Characteristics of flora in the literature (Yarova, Fedoronchuk, 2012).

Most of the park area is occupied by forest vegetation. Dominated by pine plantations of artificial origin, found throughout the territory. Pine-oak and oak forests, which are common in the northern and southern parts of the park, account for about a third of the area. By age class, these are young forests - 14.5%, middle-aged forests - 68.8%, mature forests - 7.5%, overripe forests - 9.2%. In the stands of green moss pines is dominated by Scots pine. Undergrowth is often absent, sometimes there are single specimens of *zinovata* Russian and *drok* dye.

The main background of the ground cover is determined by mosses, among which the most common are Schreber's pleurotia, dicrania, and cuckoo flax.

Of the herbaceous plants, meadow meadowsweet, Veronica medicinal, common goldenrod, nechuy-wind hairy, September sedge, and fragrant bush are rare. Occasionally there are regionally rare and red-listed species, in particular *Sontrava* blackberry, cornflower Sumy, thyme Palasiv, young Russian. Pine-oak forests are more common in the northern part of the park and are confined to slightly lower areas with richer soils. The dominant position in the upper tiers belongs to pine and oak, and under their tent there are many different representatives of the aboriginal dendroflora, including linden, tall ash, field maple, sharp-leaved and Tatar. Shrubs and low-growing trees are represented by such species as pear, mountain ash, hazel, blood-red borer, warty and European. Sometimes juniper, which is rare for the region, grows here. Adventive species, such as ash maple and robinia pseudoacacia, are sometimes found in the stand.

The tier of grasses in some areas is dominated by hairy sedge, rarely fragrant butterbur. The floristic incompleteness of this tier and the significant influence of recreational loads on it determined the dominant position in it throughout the summer of such an adventurous species as nechipai-grass small-flowered. During the spring snowdrop, several species of ephemeroids grow here - yellow anemone, dense growth, yellow and small stars, two-leaved snowdrop. Lilies, lilies of the valley and herbaceous pines predominate in the central part of the park. In addition to the lily of the valley and eagle, they are characterized by such species of perennial herbaceous plants as fragrant bush, ground marten, finger sedge, round-leaved bellflowers, goldenrod, nechuy-wind umbrella, panicle hairy, pearl drooping.

In areas with the richest soil cover and optimal moisture conditions, there are deciduous forests with a predominance of oak and Ryast is compacted with an admixture of other species. The undergrowth is dominated by hazel, sometimes with an admixture of warty cowberry.

Elderberry is widespread on the most nitrogen-rich soils, in places of stands. In the tier of grasses grow strange violet, forest purslane, Veronica dibrovna, Veronica medicinal, drupe, geranium Robert. In the meadows of pine forests, grasslands are dominated by cereals. Among them, the most common are ground marten, comfrey, meadow fire, creeping wheatgrass, meadow butterbur, Becker's fire. Among the grasses on such meadows or edges there are agalik-grass, oregano, St. John's wort perforated, nechuy-wind umbrella, Polish cross, weird flour.

Occasionally here you can find species that have the status of protected - yurina cornflower, snakehead Ruysya. On the shores of Lake Bile, there are thickets of reeds and common water coenoses with a predominance of common frogweed, duckweed, small, edible head. In forest plantations of ratites mammals are often found wild boar, roe deer, red deer, occasionally - elk. Among the predatory mammals common species are the common fox, forest marten, badger, and along the coastal strip of the Kremenchug reservoir - a raccoon dog. Sometimes there were traces of kindness. Along the shores of Fr. White - numerous traces of river otters, American mink, which settle in the burrows of river beaver. The bites of this rodent can often be observed in stands along the coastline. Of the murine rodents, the yellow-throated mouse and the red fistula predominate, and among the insectivores, the common woodpecker. The hare is a common species in forest stands.

The avifauna of the Biloozersky National Nature Park is typical for the forests of Central Ukraine. Finch dominates in forest habitats. Common species of birds are alder, great tit, black and songbird, black-headed urticaria, osprey, white-throated flycatcher, and yellow-browed shepherd. On the edges there are common oatmeal, forest shrew. Numerous several species of woodpeckers - large, small and medium

variegated, gray. There is a black woodpecker. During migrations in the forest you can meet groups of woodcocks. Of the rare species of birds here nest white-tailed eagle, black shulika. During migrations there are black stork, osprey, snake-eater, eagle-dwarf, field harrier, small-tailed deer, gray shrike.

The significance of the territory of NNP "Biloozersky" for the protection and preservation of the natural complex of the Middle Dnieper is determined by:

- representation of typical for segments of pine and forest terraces of the forest-steppe left bank, once quite common forests, which have now reduced their distribution here;

- protection of groups listed in the Green Book of Ukraine (2009): yellow pitcher formations - Kaniv Reservoir, white water lily formations - ibid, floating salvinia formations - White Lake and wetlands in the pine forest, floating water nut formations - Kaniv Reservoir;

- conservation of the biotope habitat types important for the maintenance of the region, to be protected in accordance with the revised Annex I of Resolution 4 (since 1996) of the Berne Convention, in particular

- C1.22 - free-floating vegetation of mesotrophic reservoirs with a predominance of common frogweed, aloe vera cut, floating salvinia,

- C3.41- Euro-Siberian groups of coastal aquatic vegetation with sedges, reeds, cattails, plague, etc.,

- G3.4232 -Sarmatian pine forests with steppe grasses; - growth here (Yarova, Fedoronchuk, 2012) of nine species of vascular plants from the Red Book of Ukraine (2009): Lözel's fathead minnow - included in the annexes to the Berne Convention and CiTEs. Grows alone on White Lake; feathery hairy - on the edge of an oak forest sq. 30, 31 and on the steppe slope near the Dnieper. Occurs in separate curtains; hellebore - in the park grows alone almost throughout, there are numerous populations in the oak forest (apt. 31); Siberian roosters - grows as part of shrub communities (apt. 22), the population is small (curtain about 2 m²); floating salvinia - small spots along White Lake and on a swampy depression in a pine forest (apt. 22); blackening sleep - in pine forests throughout the park; floating water nut - Kaniv Reservoir; spring mustard - on the steppe slope of the Kaniv reservoir; Astragalus woolly-flowered - on the steppe slope of the Kaniv Reservoir [10].

Taras Horizon Landscape Reserve

The reserve was declared by the Resolution of the Council of Ministers of the USSR of January 18, 1990 № 4. The total area is 405 hectares.

The reserve is located on the lands of Prokhorovsky forestry of Zolotonosha state forestry and the territory of KSP "Dnipro". Created to preserve the landscape complexes of the floodplain of the middle reaches

of the Dnieper River. It is located within the left-bank floodplain, near the town of Kaniv opposite Chernecha Hora and the tomb of Taras Shevchenko. The main idea in creating the reserve was to preserve the background landscape of the left bank of the Dnieper floodplain and terraced depressions and pine terrace segments, which together create a picturesque landscape and provide accessibility for viewing from the observation deck of the Shevchenko National Reserve. In addition, this area should represent in the nature reserve fund of the region a whole list of elements of the natural complex of the region, which are poorly represented or not represented at all.

Geographically, the territory of the reserve is confined to the Pereyaslav-Cherkasy basin on the northeastern slope of the Ukrainian Crystal Shield, which is filled with thick (up to 60 m) strata of anthropogenic deposits (Palienko et al., 1971).

Characteristic features of the relief of the territory are flat surfaces with slight depressions in the places of ancient old houses and low elevations of the sections of the channel shafts fixed by vegetation. The height of this floodplain is between 75 and about 85 meters above sea level. The main landforms are riverbed shafts complicated by aeolian deposits, accumulative spit, old depressions, bays and straits that divide this part of the floodplain into separate fragments. In addition to all the factors acting on the day surface, the surface of the floodplain is characterized by the action of two additional - flooding (flooding with water) and alluviality (silt and other sediments deposited from the water on the soil surface). In addition to these main factors that determine the current appearance and condition of the surface of this area, wind activity and economic impact are important. Features of the regime of flooding, sedimentation, current processes, etc. in different parts of the transverse profile of the floodplain determine their diversity. Within this area there are: the riverbed part of the floodplain, composed of coarse-grained sand deposits, which in the post-flood period were redeposited by the wind, transformed into dunes and thickets overgrown with long-rhizome cereals and rare verbena, shellfish and the central part of the floodplain. During floods, small (clay) fractions of alluvium and biogenic particles are deposited, such as silt, plant detritus, biomass formed by algae, etc., which provides a higher level of substrate richness.

Depending on the hypsometric level, a distinction should be made between high (occasionally flooded) and low (flooded every year) areas. In areas of high level among the grasses are dominated by short-flooded (can not withstand prolonged flooding - buckthorn, fire becker, thin panicle), and at low levels long-flooded (boneless, grass creeping, meadow foxtail, marsh tonkonig, marsh butterbur, chaplain,) see. The most common variant of soil cover in most areas is sod-meadow low-podzolic soils. Podzolic soils predominate in the areas occupied by floodplain forest and shrub phytocenoses. Hygromorphic sediments of soils with different degrees of gleying and silty deposits are formed along

local depressions, where water stagnates most of the year. Fragmentary soils (sometimes several m²) are found in small areas. About 400 species are represented in the flora of vascular plants.

The floodplain is a rather peculiar complex of plant species. Characteristic and well represented on the floodplain are aquatic, meadow, forest, psammophilous and swamp plants. The flora of the floodplain is characterized by a number of features. Formed on the youngest part of the land (Holocene age - from 12 thousand years - to this day), the flora of the floodplain did not absorb all the species whose optimum population development in our region took place in earlier times.

That is, in the flora of the floodplain there are no historical relics, which in other parts of the land sometimes make up a significant percentage of their flora. Important limiting factors for many plant species are floodplain, the predominance of ecotopes with poor, drying sandy soils during the growing season, as well as excessively moist ecotopes. Alternation of ecotopically contrasting areas, small in area, is an isolating factor for populations of many plant species. Together, all these factors determine the relative poverty of floodplain species. The same factors determine such features of the floodplain flora as: an equally high share in its composition of oligotrophs, xerophytes, hydrophytes, gidatophytes against the background of the predominant mesophytes. The participation of psammophytes is also relatively high here. A rather characteristic feature of the flora of this area, as well as any fragment of the Middle Dnieper floodplain, is the interpenetration of plant species from south to north and vice versa. So from northern plants on this site of a floodplain it is possible to meet a willow ash-gray, a sedge turf, winged, gray. And among the settlers from the south - forest rye, six-row stonecrop, woolly corolla, various types of camels. A very important feature of the floodplain flora is the presence here of populations of many psammophilous Eastern European species. Some of them should be attributed to the Sarmatian (whose primary habitat is within the forest and forest-steppe zones of Eastern Europe) and subpontic (whose primary habitat is located in the Black Sea steppes). These include, in particular, Dnieper cornflower, Dnieper feather grass, Ukrainian goatweed, Dnieper yellow grass, false carnation, and others.

Due to the activity of channel and primary succession processes, incomplete formation of phytocenoses and their floristic incompleteness on the floodplain, there are phytocenoses favorable for the settlement of neophyte species (kenophytes). Among them, alien or adventive species are sometimes quite active. Some of them, being well adapted to these conditions, are widespread in the floodplain, playing the role of dominants. In particular, these include species of North American origin - amorphous shrub, ash maple, Syrian wadding, maiden five-leaf grapes, Zlinka Canadian, deciduous herd. Regionally rare species have been noted: Tatar yellow grass, small kaulinia, white water lily, hooked mariscus, Ukrainian forget-me-not, millet sedge, Micheli's snapper, Riona water

buttercup, wintering horsetail, fluffy oatmeal, false flint. There are such Red Book species of plants as marsh cuckoo, flea cuckoo, flesh-rooted fescue, Siberian roosters, floating salvinia. Among the plants included in the European Red List grow here - Dnieper yellow grass, Ukrainian sorrel and Ukrainian goatweed. The range of floodplain phytocenoses is well represented within the reserve. In the flooded areas of old lakes, straits and bays, groups of free-floating water on the surface, attached-bottom and pri- Zozulynets marsh riparian-aquatic vegetation predominate. The background species of these habitats are such species as trivial for the Middle Dnieper floodplain, as periwinkles, grasses, scallops, sea urchins, common reeds, lake plague, and tuberous buckthorn.

Excessively humid areas of the central part of the floodplain, which are mostly released from the water in the second half of summer, are occupied by groups of herbaceous-sedge meadow tall grass, dominated by coastal, sharp-edged, sharp sedges, willow and twig-like , althaea medicinal [45, 46]. Floodplain meadows with variable humidity, which are mowed in some years, are presented in small areas. They are dominated by mostly mesophilic and hygromesophilic cereals, such as meadow foxtail, meadow foxtail, marsh foxtail, giant panicle, meadow fireweed, early sedge. Depending on the conditions of the current year and biological rhythms of activity in populations of different species, the co-dominants in such meadows may be four-seeded and rough mouse peas, onion, water horseradish, avran medicinal, vegetable molasses, fragrant chapoloch, forest steppe butterbur. Occasionally, in the second tier, grass species such as millet and black sedges are found, which is a rare phenomenon in the region. The highest areas, which were once periodically flooded for a short time, but now, after the construction of the Kaniv HPP and regulation of the Dnieper runoff, are not flooded at all occupied by groups dominated by cereals that can grow on drying sandy soils.

The most typical dominant of such sandy-desert steppe meadows is Becker's bonfire. In some places it is replaced by such a long-rhizome cereal as the terrestrial marten. Sometimes, in places with a slightly heavier mechanical composition of the soil, a continuous turf is formed by the slender-leaved. Typical representatives of the group of legumes and grasses in these meadows are plain St. John's wort, butterbur, wormwood, stonecrop six-row, caustic and large, asparagus, clover and plain clover, Veronica colossus. Floodplain forest cenoses are represented by forests of white poplar, black, and white willow, with the participation in the stands of rough elm, common oak, ash and some species of foreign origin - black mulberry, ash maple, green ash. Thickets of two adventive species of North American origin are quite common here - amorphous shrub and ash maple. In the bush tier often grow buckthorn brittle, ragweed, hawthorn. There are some small arrays

of artificial plantations of Scots pine with an admixture of Scots oak. The grass layer of all floodplain forests of the reserve is characterized by such species as common kirkazon, blackberry, tonkonig dibrovny, pyramidal sorrel, asparagus, horsetail, meadow willowherb. In some places, the lily of the valley is dominated by lilies of the valley in small areas of forest [36, 68].

On the territory of the reserve grow mushrooms that belong to different ecolotrophic groups. Symbionts of algae that are involved in the formation of lichens and symbionts of mycotrophic woody, shrubby, and herbaceous plants play an important role here. Some of the marked fungi live on dead organic remains, mostly of plant origin. This group of fungi plays an important role in nature, completing the mineralization of numerous reserves of dead branches, stumps and leaves. These are representatives of fungal organisms of the genus *Fuligo* Haller, *Lycogala* Pers., *Physarum* Pers., *Trichia* Haller. Of the true fungi grow soil macromycetes of the genera *Amanita* (Fr.) Gray, *boletus* Dill., *Clitocybe* (Fr.) P. Kumm., *Lepiota* (Pers.) Gray, *Mycena* (Fr.) Gray, *Marasmius* Fr. and representatives of wood-destroying fungi (genera *Phellinus* Quél., *Pluteus* Fr., *Polyporus* Fr., *schizophyllum* Fr., *stereum* Pers.). Among the edible mushrooms in small quantities are noted: *boletus chrysenteron* bull. and *b. Subtomentosus* L., buttercup (*suillus luteus* (L.) Roussel) and granular (s. *Granulatus* (Fr.) sFGray), among the poisonous - red toadstool (*Amanita muscaria* (L.) Hook.). Wood-destroying species of fungi are somewhat more common. Schizophylic common (*schizophyllum commune* Fr.) can often be found on the branches of deciduous trees, and brown pluteus (*Pluteus cervinus* (schaeff.) P. Kumm.) At the base of living trees and stumps. In late autumn, fungi of the genus *Tubaria* (W.G.smith) Gill were occasionally observed on plant remains. The above groups of fungi create favorable conditions for the functioning of this complex. Many species of fungi parasitize on higher plants, causing various diseases (rust, powdery mildew, spotting, rot, etc.) [57, 60].

Mammals in the landscape reserve "Taras Horizon" are represented by 23 species. Elk, roe deer and wild boar come here from remote forest lands. The common fox digs burrows in the shells. The stone marten tends more to the overgrowth of white willow and sedge stands, which grow mainly along water bodies. The forest marten occasionally lives in the same habitats as the stone marten. Dwelling badger burrows were observed at the edge of medieval pine stands, and badger tracks were recorded within the floodplain. Grace and ermine constantly live in shellyuzhniki and rarefied sedges. Abandoned burrows of the river beaver on the shores near water bodies are used for wintering and for breeding offspring raccoon dog. In some years, there were traces of wolves, European minks. Bats settle in the hollows of old willows, sedges. The background species among bats are the water nightingale,

the red partridge, the common bat, and the Natusius bat. River beaver lives in deeper water areas of bays and straits in burrows. Mouse-like rodents are represented by 4 species: common fistula, water fistula, red fistula, yellow-throated mouse. The common woodpecker predominates among the insectivores. The common species in open areas and in pine stands is the hare.

The avifauna of the Tarasiv Horizon Reserve is typical for the floodplains of the Middle Dnieper. The forest areas are dominated by finches, numerous species - alder, black and song thrush, black-headed urticaria. Gray and garden urticaria, black-and-white sheepdog and spring, thorny shrike nest in the bushes. On meadows there are meadow reed warbler, meadow hammerhead, yellow wagtail. Of the rare species here nests black shulika, previously found sivoraksha. During migrations, you can find a black stork, osprey, snake, eagle, gray shrike. Representatives of amphibians number at least 6, and reptiles - 5 species. In areas of inland waters and along the banks of the Dnieper there are spring frogs, sharp-nosed frogs, garlic, gray, pond and lake frogs. The marsh turtle lives in reservoirs. Along the coastal strip there are common snake, copperhead, common viper. In areas with sparse shrubs you can see the lizard agile.

The general ecological significance of this area for the natural complex of the Dnieper coast in the upper part of the Kremenchug reservoir is determined by:

a) ensuring the protection of local populations of the above-mentioned rare and endangered species of flora of the Middle Dnieper floodplain;
(b) the conservation of the habitat types important for the maintenance of the region's biogeocenotic diversity, to be protected in accordance with Annex I, Resolution 4 (since 1996) of the Berne Convention, as revised in 2010, in particular:

C1.22 free-floating vegetation of mesotrophic reservoirs with dominance of common frogweed, aloe vera cuticle, floating salvinia; - C1.34 rooted-floating vegetation of eumesotrophic reservoirs with dominance of water buttercup;

- C3.41 Euro-Siberian groups of coastal aquatic vegetation with sedges, reeds, cattails, plague, etc .;

- C3.51 Euro-Siberian groups of short juveniles on periodically flooded coasts with dominance of water mullet, amphibian water horseradish, needle minnow;

- E 3.4 fresh and moist mesotrophic onions with a predominance of meadow foxtail, meadow sedge, early sedge, ground marten, creeping wheatgrass;

- E5.4 wet and wet highly digestive onions with a predominance of marshmallow, viper;

- G1.11 coastal floodplain forests dominated by white willow, black and white poplar; c) the importance of this section of the floodplain as a field of natural flood waters discharged from the upper reaches of the Kaniv HPP and which are widely used for water supply in the southern regions of Ukraine; d) the role of this territory as a spawning ground for most of the populations of industrial fish species (bream, carp, crucian carp, roach, catfish, golovan, verkhovod, etc.) of the Kremenchug reservoir.

Botanical reserve of national importance "Rusko-Polyansky"

The reserve was declared by the Resolution of the Council of Ministers of the USSR of September 11, 1980 № 524.

Located on the territory of two quarters (quarters 106 and 107 according to the materials of forest management in 2003) of Rusko-Polyansky forestry. Its total area is 166 hectares. Geologically and geomorphologically, this area is a part of the pine terrace, the surface of which is within the range of 100 - 120 m above sea level. and has a general slope to the west, to the swampy valley of the river Irdynka. Above are layers of alluvial (river origin) and aeolian (wind origin) medium-grained sands, which are lined with glacial sand deposits below. Changes and local decreases of water and wind origin are characteristic, which gives the relief the appearance of a gently undulating plain. The predominant soil type is sandy, slightly podzolic. They are characterized by a low-strength humus layer (up to 10 cm). The low proportion of clay rocks and the absence of many minerals in the parent rock determine their relative poverty for soil nutrients.

The entire territory of the reserve is occupied by long-growing forests, which show signs of natural mosaic, determined by the duration of the demutation process and the diversity of natural habitats. The most typical for elevated areas are sparse pine and pine-oak forests with a tier of xerophilous grasses. The upper tier is dominated by Scots pine. The second tier, sometimes not pronounced, is formed by oak, linden, hornbeam. Fragments represent the tier of shrubs (warty bush, Tatar maple, red elder, hazel, buckthorn, mountain ash, Russian zinovat, drick dye) and undergrowth of the above trees. The species composition of herbaceous plants in such forests is quite rich. About 50 species of vascular plants are observed within one descriptive area of 0.3 ha. The role of dominants or co-dominants in different areas may be such species as common eagle, lily of the valley, fragrant bush, cane marten, ground marten, mountain smelt, grove, stonecrop, September sedge, nechuy-wind hairy, early sedge. There are beautiful flowering plant species everywhere, which in different phenological terms give these forests a unique beauty and attractiveness.

These are bells persicolisty and round-leaved, achiroforus spotted, geranium blood-red, a letter letter medicinal, a hangman spreading, an aster scabbard, an alpine clover, a true butterbur, nechuy-wind umbrella. There are also numerous populations of some regionally rare species: false Phrygian cornflower, meadow-steppe eremogone, dioecious cat's paws, rhizome sedge, Hungarian roosters, purple scorzonera, sand eel, Prussian old oak, large-flowered violets, violet. On the territory of the reserve in the oak-pine forests in the lower tier grow fragrant wolfberries (boletus) - a Euro-Mediterranean species with limited distribution, listed in the Red Book of Ukraine. Here its settlements are located within the Dnieper exclave (a separate fragment) of its area. This highly decorative rare and relict species in the recent past had a fairly high density of individuals in local populations. In particular, within the boundaries of Rusko-Polyansky forestry there were areas with up to 1500 bushes per 1 hectare (Antonyuk et al., 1982).

At the time of the survey (June 2012), scattered curtains of this type were noted on the edges of the suburbs, along the clearing that runs under the power line. In some curtains there are up to 50 shoots. Shoots, which are characterized by signs of good vitality, are most often observed in places where a well-formed moss layer with Schreber's pleura. Ovaries and fruits were absent. In sparse pine-oak plantations, the found curtains had a much worse state of vitality, which is obviously determined by the greater shade of these habitats and the absence of a layer of moss. The decrease in the number and deterioration of the living conditions of individuals of this population of boletus is caused by a gradual change in the composition of the stand, namely - an increase in deciduous trees and shrubs and, accordingly, increasing shade and lack of soil nutrition. Similarly, such a Red Book species as the broad-leaved dream-grass is widespread here. In well-lit areas of the node and meadows, the loci of its populations have a full range of age states. There are seedlings, young individuals of pregenerative age and generative. 7-8 peduncles were observed on some individuals of generative age, which indicates high seed productivity. Mycological flora is represented by phytotrophic micromycetes from Ascomycota, basidiomycota and groups of anamorphic fungi. Of the Asco fungi, in almost all of the above areas, the impression of the leaves of trees of generative age and seedlings of common oak was observed with the erysipelas fungus - the oak microsphaera (*Microsphaera alphitoides* Griff. Et Maubl). Maple and Tatar maple are very affected by the rhytismatic fungus - *Rhytisma acerinum* (Pers.) Fr. Of the herbaceous plants, common powdery mildew is widespread. Of the basidiomycetes, rusty fungi on dog rose and aspen undergrowth predominate, of herbaceous plants, ruminant lominis and rupture-small-flowered grass are affected. A small number of soil macromycetes were observed - fungi of the genus

Coprinus (Fr.) Cray, Lycoperdon Pers. and wood-destroying species of the genus Trametes Fr., Fomes (Fr.) Gillet, Polyporus Fr. Pluteus cervinus Fr. was often found near the trunks of deciduous trees and on stumps. Occasionally there are Fomitopsis unita (Pers.) Bond. And Fistulina hepatica schaeff. Ex Fr. ex Fr.) Karst.). A representative of anamorphic fungi is Phyllosticta cruenta (Phyllosticta cruenta (Fr.) Kickx.) On the leaves of fragrant bush and lily of the valley. Among the insects on the edges are often listed in the Red Book mahogany.

The significance of the territory of the botanical reserve of national importance "Rusko-Polyansky" for the protection and preservation of the natural complex of the Middle Dnieper is determined by:

- the conservation in its territory of the habitat types important for maintaining the region's biogeocenotic diversity, to be protected in accordance with Annex I Resolution 4 (since 1996) of the Berne Convention, in particular deciduous forests on mesotrophic and eutrophic soils (G1.A1,4). and Sarmatian pine forests with steppe grasses (G3.4232);

- the presence of populations of the above species of plants and animals, which are properly protected in the region.

Lipiv Ornithological Reserve

Created in accordance with the Resolution of the Council of Ministers of the USSR of October 28, 1974 №500. Area - 4500 hectares.

Lipiv Ornithological Reserve is a place of reproduction of waterfowl in the Middle Dnieper region on the Kremenchug Reservoir.

It is a shallow coastal waters and a flood-island massif, located on the left bank of the Kremenchug reservoir above the city of Cherkasy, in the triangle "Railway Bridge - p. Chapaivka - the village of Kedina Hora ", 7 km northeast of Cherkasy. The northern border runs from the outskirts of the village. Kedina Hora along the water's edge of the reservoir to the railway near the village of Chapaivka; the eastern border is located along the railway from the village. Chapaivka to the northern entrance of the railway bridge; the southern boundary runs from the northern entrance of the railway bridge to the buoy area №59 on the reservoir is a distance of 6270 m; the western border runs from the buoy №59 along the water area of the reservoir to the outskirts of the village. Kedina Hora and is a distance of 5900 m. The distance from the railway station "Panske" to the outskirts of the village. Kedina Hora is 8740 m, the distance from the railway station "Panske" to the area of the buoy №59 (turn of the border) - 6750 m. In 1989, in accordance with the Order of the Executive Committee of the Cherkasy Regional Council of People's Deputies "On the creation of a protection zone of the Lipiv State Ornithological Reserve" dated 30.01.1989 №136-r, the zone of the reserve, 200 m wide at the expense of the water area of the Kremenchug reservoir.

The reserve is included in the list of ibA-territories of Ukraine (Gavrilyuk, Grishchenko, 1999). The area where the reserve is located is a left-bank floodplain of the Dnieper flooded to a depth of 1-3 m by the waters of the Kremenchug Reservoir.

Geographically, it is confined to the Pereyaslav-Cherkasy depression of the north-eastern slope of the Ukrainian crystalline massif, within which thick strata are filled with deposits of the Middle Anthropogenic period. Its surface is composed of sandy, sandy-clay deposits of deluvial and alluvial origin. Below the shore is a chain of islands, which are the remains of the second, or pine terrace. The bed is composed mainly of alluvial deposits. The site in its current form arose as a result of over-regulation of the Dnieper by the dam of the Kremenchug reservoir. The hydrological regime of the reserve is determined by the dynamics of the reservoir level. Due to the flooding, there was a secondary leveling of the surface of this area, which determined a slight difference in height within it. The reserve is completely located within the catchment area of the Dnieper River. The main source of water is the Dnieper River itself, whose water enters the Kremenchug Reservoir through the dam of the Kaniv HPP. Other sources are the rivers Ros, Vilshanka, Tyasmin, and Sula. Most of the catchment area is covered with podzolic, leached and typical chernozems. The climate of the catchment area is moderately continental.

Icemaking in the Kremenchug Reservoir usually lasts from December to March (Information Letter, 2004), although in modern conditions, when warm winters are observed, the surface of the reservoir may not be covered with ice for much of the winter, as observed in recent years. As the water level in the reservoir decreases at the end of autumn, large sand ponds are exposed, between which there are straits. Botanical and geographical affiliation of the area on which the reserve is located: Northern forest-steppe region of the Dnieper terrace plain, Dnieper floodplain-pine area (Information letter, 2004).

The main part of the wetland is shallow water, which is exposed to intense wind and wave effects from the reservoir and is 90% occupied by submerged vegetation. It is dominated by reddish-leaved, shiny, grassy, crested. The coastal strip and the space between the islands and the coast are overgrown with air-water vegetation with a predominance of narrow-leaved and broad-leaved cattails, common reeds, rarely lake plague, tuber, broad-leaved tits. Released from under water in the second half of summer, shallow waters along the shore are overgrown with small strips of low-growing vegetation with the participation of amphibian water horseradish. Floodplain forests of secondary origin are usually fragmented along the coast and on small islands.

Among them, the most common are rare forests with the participation of white willow and scaly. In some cases, in the driest areas, there are fragments of forests with pines, where some species of plants recommended for protection in Europe grow. In particular, it is the Dnieper yellow grass and Ukrainian goats. Due to the uniformity of habitat conditions, the flora of the reserve is quite poor. About 150 species of vascular plants were noted. The best represented complex of aquatic and coastal-aquatic flora. In addition to the above, there are umbrella sumac, arrow-leaved arrowhead, submerged kushir, duckweed triborozenchasta, small, spirodela multi-rooted, water yolks hairy and forked, leersia rice-shaped, plakuni verbalisty and prutopegny, large. Among the meadow plants on the islands are often such trivial species as terrestrial marten, creeping wheatgrass, early sedge, marsh sedge, meadow foxtail.

The general ecological significance of this area for the natural complex of the Dnieper coast in this section of the Kremenchug reservoir is determined by:

a) ensuring the protection of local populations of species listed in the Red Book of Ukraine, in particular floating water nut, floating salvinia;

(b) the conservation of the types of habitats important for the maintenance of the region's biogeocenotic diversity to be protected in accordance with Annex I of the Berne Convention, revised in Annex I, revised in 2010, in particular:

- C1.22 free-floating vegetation of mesotrophic reservoirs with dominance of common frogweed, aloe vera, salvinia floating;

- C1.34 rooted-floating vegetation of eumesotrophic reservoirs with dominance of water buttercup;

- C3.41 Euro-Siberian groups of coastal aquatic vegetation with sedges, reeds, cattails, plague, etc .;

- E 3.4 fresh and moist mesotrophic onions with a predominance of meadow foxtail, meadow sedge, early sedge, ground marten, creeping wheatgrass;

- E5.4 wet and wet highly digestive onions with a predominance of marshmallow, viper;

- G1.11 coastal floodplain forests dominated by white willow, black and white poplar; c) the role of this territory as a spawning ground for most of the populations of industrial fish species (bream, carp, crucian carp, roach, catfish, golovany, verkhovod, etc.) of the Kremenchug reservoir.

c) protection of groups listed in the Green Book of Ukraine, in particular with the dominance of yellow jugs, white water lilies and water nuts (Information letter, 2004).

Zooplankton in the reserve is represented by daphnia, bosmina, hydorus, cyclops, rotifers. Its biomass is more than 0.3 g / dm³ of water.

Zoobenthos: chironomids, oligochaetes, mollusks. Biomass - more than 500 g / m². The entomofauna of the reserve is still poorly studied, but it is known that there are some rare species of insects, including mahogany, podalirium, polyxena, deer beetle, purple xylocope [7].

The reserve is known for 16 (State Cadastre, 1998) species of bony fish, including bream, pike perch, carp, ide, pike, goby, roach, perch, bruise, asp, catfish, bleak, ruff, rivet, tulk. As well as 3 species of amphibians, 2 - reptiles, 8 species of mammals, including gray or brown hare, squirrel, fox, wild boar, spotted deer (State Cadastre, 1998) and listed in the Red Book of Ukraine ermine, roe deer, beaver [10].

There are also more than 160 species of birds in the reserve. Its avifauna is best studied during migrations, when clusters of migratory waterfowl and waterfowl are formed within the reserve, which rest and feed here. The number of birds in these clusters can reach tens of thousands of individuals. Autumn clusters have been regularly studied since 1995 (Gavrilyuk, 1998, 2002, 2008), and since 2007 the study of spring clusters has been started (Borisenko et al., 2010).

The dominant species in autumn clusters are mallards and coots. Mallard is the most common representative of river ducks in the fauna of the region. During the autumn flight, very large numbers were registered, in particular, on November 21, 2007 and November 16, 2008, more than 14,000 people were detected, and on November 28, 2010 - more than 16,000 people. And the maximum number of this species reaches the end of the autumn season. If the beginning of winter is mild enough and the reservoir is not covered with ice, a large number of mallards remain for the winter.

In the spring, its number is lower, but it is also dominant. Coot belongs to the most numerous species of waterfowl in the region, is a common nesting species of the reserve's fauna. But the largest number of this species is also observed during the autumn migration. The largest registered number was found on September 7, 2008 - 7,000 people. It is characteristic that in spring clusters this species is observed rarely and in small quantities. Martin and common crested grebe are also numerous in migratory clusters. Rare species listed in the Red Data Book of Ukraine may be present in migratory clusters, such as boar, red-billed blackbird, midget, Caspian martin, Caspian tern, Gogol (which is a common species, often numbering hundreds of individuals). The little swan was first discovered in Cherkasy region in these migration clusters, it occurs both in autumn and spring.

Not listed in the Red Book, but very rare in the region, sea urchins, sailors, turpans and bluebirds are also found in these clusters. The large number of potential victims attracts predators. Yes, almost always near the clusters there are white-tailed eagles, occasionally there is a peregrine falcon. As transit migrants in the reserve are noted osprey, kite

field, snake-eater, gray crane, blue pigeon, gray shrike. During the nesting period, coots, mallards and waterfowl are observed among waterfowl in coastal overgrown areas, and several pairs of reed echoes were found. These areas use large white, gray and red herons, black and white-cheeked terns to feed.

White-tailed eagles are often observed, but there is no data on nesting of this species within the reserve yet. On the dam across the Kremenchug reservoir there is a nesting colony of river and small terns, small sandpipers nest, pairs of waders-forty are noted (Gavrilyuk et al., 2008). The small tern and sandpiper forty are listed in the Red Book of Ukraine. In winter, as already mentioned, large accumulations of mallards can persist, but after the reservoir is covered with ice, most of them leave the reserve. In such conditions, large and small crabs, gogols, mallards, and yellow-legged martins are mainly observed on the ice-holes. Among the problems of the reserve an important place is occupied by frequent violations of the protected regime (including illegal hunting), which leads to frightening birds.

Hydrological reserve of national importance "Shulyatske bog"

The reserve was created by the Resolution of the Council of Ministers of the USSR of 28.04. 1993 №14-21, as amended by the Decree of the President of Ukraine of 20.08.1996 №715 / 96. Area 940 hectares.

The territory of the reserve represents the areas of the lower level of the valley of the Mountain Tikich, which have a polygenetic origin. Separate, small massifs, composed of medium-grained sand deposits of the surface, are obviously of ancient alluvial origin, and the depression and the raised side part are composed of heavier rocks, which are obviously of proluvial origin. These rocks serve as the maternal basis of the soil cover. The soils of the hydromorphic series predominate: sod-podzolic gley and gley, lowland-swamp (peat-gley, peat), meadow-swamp. Vegetation is represented by groups of meadow, meadow-swamp, forest-swamp, coastal-water, aquatic vegetation.

On the surface of standing and low-flowing waters of artificial canals, groups of free-floating and rooted species are developed. Among the dominants there are small and furrowed duckweed, multi-rooted spirodela, shiny, comb and floating rhodes, yellow jugs, spiked watercress, immersed kushir, common frogweed, aloe vera cut. Among the coastal-aquatic vegetation, the largest areas are occupied by groups dominated by southern reeds. In addition, there are areas with a predominance of broad-leaved and narrow-leaved cattails, lake plague, large flatbread.

Among the meadow-swamp vegetation, long-rhizomat-sedge (sharp, pointed, coastal sedges) and less often sod-sedge (sod sedges

and winged) groups predominate. This type of group is characterized by the presence of populations of most species of wetland flora in our region. The alders and thickets of ash-gray and five-stemmed willows, which surround the numerous overgrown old trees, are forest-swamp vegetation.

The meadow-swamp areas of the reserve are home to a large number of populations of the red-fleshed glove, which is listed in the Red Book of Ukraine. As for most meadow-swamp species of orchids of our flora, it is characterized by periodic abrupt changes in grassland participation rates and the number of individuals (fluctuations). In some years, you can see the aspect of the mass of flowering plants, and sometimes their presence here can be detected only in the presence of individual individuals. Meadow and synanthropic vegetation are represented by groups of different stages of development and different ecotopic differences. In the fallow areas you can find fragments of groups dominated by synanthropic nitrophilous plants (wormwood, nettle, thistle, elderberry). In the riparian parts of this meadow-swamp massif, on well-drained and recently, apparently, plowed areas, there are considerable areas with vegetation, representing different stages of development of fallows - from long-rhizome to rhizoderned. Creeping wheatgrass is a typical dominant on them.

They are characterized by a colorful mosaic of grasses, which combines coenopopulations of species with different behavioral strategies. This allows them to coexist for a long time. Among them you can find typical spring annuals (odorless chamomile, white quince, compass lettuce), winter annuals (Russian novel, blue cornflower, annual stenactis), typical biennials (thistle, evening primrose, wild carrot) long-rhizomatous, field birch, ground marten, creeping wheatgrass, field horsetail, marsh reader), densely soddy and rhizodernistyh perennials (national grasshopper, meadow fireweed, meadow tonkonig, furrowed fireweed). On slightly saline soils, which are found in fragments on depressions, there are groups with a predominance of halophilic species. The most typical variant of them is meadows with co-dominance of spread sedge, dark-flowered sedge, and gray thistle. There are also such uncommon species in the region as sea bass, two-row sedge, compressed (blismus) compressed, Tabernemontan reed, compressed sedge, beskylnitsa placed.

A characteristic feature of these groups is the high level of their floristic richness. In fact, most species of meadow ecology can be found here. Among the protected plant species here is often found marsh queen, which is listed in Annex I of the Bern Convention. In addition, within this massif there are regionally rare valerian table, three-leaf clover, water frog, buttercup, white nymph, snow-white nymph, panicle sedge, barley sedge, medicinal rootstock. The crucial role in the

formation of mycobiota in this area belongs to vascular plants, because they are a nutritious substrate for parasitic fungi. Here, 17 phytotrophic micromycetes were found, which parasitize on 18 host plants (including 1 species each on woody and shrubby plants, and 16 species on herbaceous plants). Phytotrophic micromycetes of the Shuliak meadow-swamp massif are represented by 17 species from 9 genera of 3 orders from the divisions of Oomycota, Ascomycota, basidiomycota. The species composition of phytotrophic micromycetes is dominated by representatives of the orders Erysiphales (10 species) and Uredinales (6 species).

In the genus spectrum, the genera *Erysiphe* DC are the most fully represented. *emend et s. Takamatsu.* and *Puccinia* Pers. Among the found fungi of the order Erysiphales, Peronosporales and Uredinales are species that are common to Cherkasy and new species to the Middle Dnieper. In particular, among powdery mildew and rust fungi new species for the mycobiota of the Middle Dnieper are: *Leveillula scolymi* (Prost) Durrieu & Rostam, recorded on *inula helenium* L. in Shulyatsky meadow-swamp massif, which is located within Zhashkivsky and Monastyryshchenivsky 03 administrative. 2006 (holomorph) [22]. *Puccinia sonchi* Rob. on *sonchus palustris* L. - Shuliatsky meadow-swamp massif, which is located within Zhashkiv and Monastyryshche administrative districts, 03.08.2006 (III); Creeping clover (*Trifolium repens* L.) turned out to be a new food plant for powdery mildew fungi in Cherkasy region. In many places of research of the Shulyatsky meadow-swamp massif, a mass impression of ergot high (*inula helenium* L.) by powdery mildew and rust fungi was observed, and the joint development of these fungi on one plant was repeatedly observed. Shuliatske bog is a nesting place for dwarf eagles, black storks and other birds listed in the Red Book of Ukraine.

The general ecological significance of this area for the natural complex of the upper part of the Mountain Tikich valley is determined by:

a) ensuring the protection of local populations of the above rare and endangered species of flora of the region;

(b) the conservation of the habitat types important for the maintenance of the region's biogeocenotic diversity, to be protected in accordance with Annex I, Resolution 4 (1996) of the Berne Convention, revised in 2010, in particular:

- C1.22 free-floating vegetation of mesotrophic reservoirs with dominance of common frogweed, aloe-like teloris;

- C1.34 rooted-floating vegetation of eumesotrophic reservoirs with dominance of water buttercup;

- C3.41 Euro-Siberian groups of coastal-aquatic vegetation with sedges, reeds, cattails, plague, etc .;

- E 3.4 fresh and moist mesotrophic onions with a predominance of meadow sedge, early sedge, ground marten, creeping wheatgrass;
- E5.4 wet and wet highly digestive onions with a predominance of marshmallow, viper;
- G1.11 coastal floodplain forests dominated by white willow, black and white poplar; c) the importance of this area of natural and semi-natural origin by vegetation as an ecostabilizing block within the upper part of the basin of surface water runoff of one of the important rivers for the region - Gorsky Tikich.

Complex natural monument "Cossack shaft"

The object was declared by the Order of the Council of Ministers of the USSR from 14.10. 1975 №780-r. Area - 8 hectares.

It is located east of the village of Khyzhyntsi, Lysyansky district. The territory of the monument itself is a man-made shaft, 2-3 to 5 meters high, several to 20 meters wide at the base of the sole and about 8 kilometers long. On the outside it is surrounded by a moat. In some places, the outer side of the shaft has a fairly steep slope (up to 45-50%).

In some sections it is cut by a road, a spur of one of the ravines and buildings within the village of Zhurzhyntsi. According to the results of historical and archaeological research of the second half of the twentieth century. it is established that in this place in 6-5 centuries BC there was a settlement of Scythian time. It is probable that in later times these fortifications were used by the Cossacks as a watchtower and observation post, which is why the current name of the rampart is connected.

According to the physical and geographical zoning, this territory belongs to the Shpola-Olshansky district, the Central forest-steppe region of the Dnieper Upland, the Dniester-Dnieper forest-steppe province of the Forest-steppe zone.

In geomorphological terms, this object is located within the central part of the Ukrainian crystalline shield, where the thickness of sedimentary rocks is represented by Paleogene deposits of Kharkiv (grayish-green fine-grained glauconite-quartz sands) and Kyiv (light green and bluish-gray-gray merige). and Neogene clays, covered on top by thick deposits of forest-like loams of anthropogenic time.

The area where this natural monument is located is a raised part of a hilly forest plain with average heights of more than 220 m above sea level. g. m., which is quite strongly dissected by beams. The soil cover is represented by washed away chernozems. Currently, most of the area around the shaft is used as arable land and pastures. The surface of the shaft itself is overgrown for most of its length with groups of meadow-steppe vegetation and secondary forests.

The predominant dominants in forestless areas are long-rhizome perennial cereals such as wheatgrass intermediate, fine-legged narrow-leaved, early sedge, boneless stalk. Everywhere in the role of co-dominant is astragalus sainfoin. Less often, some small areas, there are fairly dense thickets of vetch, deciduous wormwood, clover medium. Only a small part of the shaft surface is occupied by groups dominated by dense-grained cereals - Welsh fire. A significant part of the species richness of these groups are widespread in the region species of meadow steppes, which play a secondary role in grasslands: bearded, meadow and grove sage, late dandelion, Kalinichenko's milkweed, tuberous iron, crowded bellflowers, mountain clover, cutter, mykolaychyky field and plain, Veronica Austrian, cumin sandy, soaring ordinary. There are also scattered populations of some regionally rare plants: German purslane, valerian, butterbur. At the foot of the shaft and at its positions are formed thickets of laxative, elderberry, hawthorn, pear, dog rose, nettle. The northern slope of the shaft is also characterized by thickets of tubers, thuringia lavatory, raspberry, blueberry, and vervain.

Forests, which occupy a significant part of the shaft area, are of artificial origin. This is mostly a small-leaved linden plantation. There are also hornbeam, maple and field maple. For the most part, these forests do not have a tier of forest grasses. Occasionally there are only curtains of fragrant butterbur. Common herbs also include butterbur, dioecious nettle, and urban gravel. In general, this natural monument is also an important object of historical significance. To increase its actual environmental significance, Veronika Dibrovna is advisable to take measures to reproduce populations of rare species of meadow steppes protected in Cherkasy region and Ukraine. In particular, it is possible to implement with high efficiency projects to restore populations of such species as hairy feather grass, young Russian, multi-colored brandy, pale hyacinth, abandoned viper, and others.

The general ecological significance of this area is determined by the preservation of important for maintaining biogeocenotic diversity of the region types of habitats to be protected under the revised in 2010 Annex I Resolution 4 (since 1996) of the Berne Convention in particular ^ - E1.2 groups of perennial xerophilous plants on black steppes) and the preservation of populations of several regionally rare plant species.

Complex natural monument of national importance "Moshnivska Oak"

Created by the Resolution of the Council of Ministers of the USSR of October 14, 1975. № 780-r. in Cherkasy district on the territory of Moshnivsky forestry, is managed by SE "Cherkasy forestry". Area - 19 hectares.

It is located on several slopes and upper parts of the hills in the edge, relative to the floodplain of the river Vilshanka, the strip of Moshnogorsky ridge (sharply elevated area of deeply eroded and dislocated terrace), located southeast of the center of Moshny village. Vegetation is represented by deciduous forests. The basis of the stands are old plantations of oak. Most oak trees are of considerable age. In particular, many of them are older than 150 years. In some areas of the stand there are separate, fairly old Scots pine trees. Everywhere such species as common ash, maple, hornbeam, and small-leaved linden take a significant part in the formation of the stand. Unlike oak and pine, populations of these species have a spontaneous origin.

Undergrowth is formed mostly by sharp-leaved maple, less common ash gum, field maple and hornbeam. In a large part of the site, a dense undergrowth is formed by lilac. Its population, of course, is of artificial origin here. Apparently, its origin is connected with the existence here at the end of the XIX century of the estate of Countess EA Balashova. The grass layer is not expressed everywhere. Significant areas belong to the dead cover forests. They are characterized by the absence of a formed and closed tier of grasses. Nitrophilous species such as celandine, spotted nettle, butterbur, dicotyledonous nettle, dioecious nettle, small-flowered grass, hybrid quince, and Robert's geranium are found only occasionally here. In some areas, where the tier of grasses is more pronounced, there are such typical deciduous forest species as yellow vegetables, aster, European ungulates, fragrant bush, dark medunka, giant bonfire, and prosyanka sprawling. On the steep slopes of the oak forests of the southern exposure, such herbaceous perennials as tonkonig dibrovny, mycelis wall, prazelen ordinary, chestnut are active. Rich natural conditions, dissected relief, diversity of plant groups, rich flora of higher plants contribute to the development of rich mycological flora, which is now little studied - only one publication is known (Lavitskaya, 1949).

As a result of research, 38 species of fungi and fungal organisms from Myxomycota, Ascomycota, basidiomycota and groups of anamorphic fungi were identified for this area. Of the myxomycetes on dead wood and rotten stumps, *Lycogala epidendrum* (L.) Fr. and *Stemonitis axifera* (bull.) T. Macbr. The class of Ascomycetes is dominated by erysipelas (powdery mildew) fungi. On the leaves of trees of generative age and seedlings of common oak, there was a significant development of a representative of erysipelas fungi - oak microsphaera (*Microsphaera alphitoides* Griff. Et Maubl.). Herbaceous plants include powdery mildew, yellow garlic, horse garlic, dioecious nettle and sorrel. The sharp-leaved maple was affected by the rhytismatic fungus - *Rhytisma acerinum* (Pers.) Fr. Of the wood-destroying fungi, *Xylaria polymorpha* (Pers.) Grev. Prevailed on fallen trunks and old stumps.

From the class of basidiomycetes, soil macromycetes of the genus *Agaricus* Fr., *Coprinus* (Fr.) Gray, *Clitocybe* (Fr.) P. Kumm, *Mycena* (Fr.) Gray, *Lycoperdon* Pers. and wood-destroying fungi of the genus *Ganoderma* P. Karst., *Polyporus* Fr., *Trametes* Fr. and other. Among them *Ganoderma lucidum* (Fr.) P. Karst. - a rare mushroom. The representative of anamorphic fungi was *Phyllosticta cruenta* (*Phyllosticta cruenta* (Fr.) Kickx.) On the leaves of the multi-flowered bush.

Among the raptorial mammals in the territory of the Moshnivska Dibrova tract, 4 species have been registered. The most common here are roe deer and wild boar. Occasionally red deer and elk enter the forests. Among predatory mammals 6 species were noted. Often in this area you can see traces of the common fox, raccoon dog, forest marten, badger, weasel, ermine. The background species among murine rodents are red fistula and yellow-throated mouse. Insectivores are represented by woodpeckers and small.

The main environmental significance of this area is determined by the presence here of fairly old plantations of common oak. Its winged crowns serve as a refuge for many species of forest birds and animals.

Complex natural monument of national importance Kholodny Yar tract

Created in accordance with the Order of the Council of Ministers of the USSR №1085-r of October 1, 1968 near the village. Millers of Chyhyryn district. Area 553 hectares. It is managed by the State Enterprise "Kamyanske Forestry".

Kholodny Yar tract is located southwest of the village of Melnyky, Chyhyryn district. This is a plot of forest land within the famous Kholodnoyarsk forest. Geotectonically, the territory is confined to the slopes of the Chyhyryn anticlinorium (uplift) of the crystalline basement, the surface of which is covered only by anthropogenic, Neogene and sometimes Paleogene deposits of small capacity. The general slope of the surface to the east to the valley of the river Tyasmin and its right-bank tributary Sriblyanka is expressed. Within the territory, the most common are ancient erosional landforms in the form of wide beams, confined to the slopes of the river valley. Most of the area is in the range of 150 - 200 m above sea level.

In many places, the outcrops of underground aquifers drain at the foot of the slopes and the tops of the beams. Anthropogenic rocks forming the day surface on the plateau and slopes are represented by loess-like loams or clayey rocks of pre-anthropogenic age. Modern and ancient alluvial-deluvial deposits are widespread in river valleys and gullies. These rocks formed medium and heavily washed light gray and gray forest soils.

The whole territory of this object is covered with forest vegetation. High-quality (with high growth intensity) old deciduous forests over 70 years old predominate. The stand is dominated by such species as common oak, tall ash, heart-shaped linden. The second tier of stands is sometimes formed by hornbeam, rough and smooth elms, sharp-leaved and field maples, and common pear. In the undergrowth, in addition to the undergrowth of these trees, grow elderberry, warty cowberry, rarely viburnum, laxative, blood-red feverfew, hawthorn monocot, hazel, European cowberry. An essential feature of these forests is the presence of seedlings and undergrowth of many of these species. In particular, you can often see the thick undergrowth of tall ash, field and sharp-leaved maples, linden, rough elm. This distinguishes these forest biogeocenoses from many similar deciduous forests in the region and determines the probability of recovery of individual stands here naturally. The layer of herbaceous plants is quite rich in typical species of deciduous forests. It presents the most diverse types of grasses in terms of biogeocenotic role, life strategy and phenology. Among the dominants and co-dominants that have a high constancy (common in this type of forest) are spring ephemerals and hemi ephemerals (intermediate growth, compacted growth, bear onion, buttercup anemone, snowdrops and Siberian, spring wheat, bulbous wheatgrass) (hairy sedge, yellow vegetable, finger sedge, deaf spotted nettle, European ungulate, star anise), summer green perennials (common primrose, dioecious nettle, perennial coppice, multi-flowered bush), winter and spring annuals - grass ordinary, butterbur tenacious, sandy cardaminopsis, butene heady).

Among the plant species that grow here, there are rare plants in the region, such as Egonikhon violet-blue, St. John's wort, Marshall's growth. Within this part of the Kholodnoyarsk forest are populations of two species of plants listed in the Red Book of Ukraine. These are a folded snowdrop and an oak tulip. This is the place of folding snowdrop growth - so far the only one found for the plains of Ukraine. The question of its origin remains open. It is quite probable that this is a relict (residual) area, once quite a large area of this species in the southern part of the Dnieper forest-steppe. According to another version, it may be a population that arose as a result of artificial introduction of this species by humans in later times. Now this population of the species is characterized by normal reproduction of individuals by seed, which determines the possibility of its long-term survival in these forests, subject to a certain environmental regime. The most likely threat to the existence of this population of the species is continuous felling of stands. Such a rare species of our flora as the oak tulip also grows on large areas. This member of the genus Tulip has a number of adaptations to vegetative reproduction and is characterized by vegetative motility. The

areas with the largest number of its shoots are located on elevations with sparse stands. The natural conditions of the Kholodny Yar tract, due to the high humidity of substrates and soil throughout the growing season, the great taxonomic diversity of vascular plants, a large set of ecotopes, contribute to the development in this area consortially related to host plants of different taxonomic groups of fungi.

This made it possible to provide 211 species of fungi and fungal organisms of 32 orders, 5 classes of Myxomycota, Oomycota, Ascomycota, basidiomycota and groups of anamorphic fungi for the tract during the first short-term mycological surveys of the Cold Yar territory. Most are fungi from the basidiomycota division (164 species). Among them are known edible fungi, including white fungus (*boletus edulis* Fr.), grasshopper (*Leccinum aurantiacum* Gray), birch (*L. scabrum* (Fr.) Gray), chanterelle (*Cantharellus cibarius* Fr.), autumn honeysuckle (*Armillaria mellea* (Fr.) P. Kumm.) And others. Registered in the tract of Cold Yar and dangerously poisonous fungi, such as pale toadstool (*Amanita phalloides* (Fr.) secr.), Panther amanita (*A. pantherina* (DC.) Krombh.), Poisonous red mushroom (*Agaricus xanthodermus* Genev), honeysuckle -yellow false (*Hypholoma fasciculare* (Huds.) R. Kumm.), etc. Along with the species that often occurred in this area and are quite common in Ukraine, rare species were found here, which were previously listed for Ukraine only from 1-4 locations.

These include *Helvella pezizoides* Afzel., *Melanoleuca melaleuca* (Pers.) Murrill, *Panaeolus papilionaceus* (bull.) Quél., *Clitocybe ericetorum* (bull.) Fr., *bjerkandera adusta* (Willd.) P. Karst. etc. From the mycological point of view, the macromycetes *Mutinus caninus* Fr., *Ganoderma lucidum* (Fr.) P. Karst are of conservation value. and *Lentinus tigrinus* (Fr.) Fr. The first of them is a rare species listed in the Red Book of Ukraine. The second is also a rare valuable medicinal fungus, the object of research in modern mycology [66].

The significance of the territory of the natural monument "Cold Gorge" for the protection and preservation of the natural complex of the Middle Dnieper is determined by:

- representation here of typical for the region, zonal type of deciduous forests, which reduce their distribution in connection with the current methods of forestry;

- protection of groups listed in the Green Book of Ukraine (2009): large areas of common oak forests with a predominance of herbaceous bear onions;

- conservation of biotope-important biodiversity types to be protected in the region, to be protected in accordance with Annex I Resolution 4 (1996) of the Berne Convention revised in 2010, in particular: G1.A1.4 deciduous forests in mesotrophic and eutrophic soils;

- the reliability of conservation of populations of many of the above plant species to be protected in Ukraine.

Complex natural monument of national importance Burty tract

Announced by the Order of the Council of Ministers of the USSR of October 14, 1975 № 780-r. Area 10 hectares. It is located in the south-eastern outskirts of the village of Lyashchivka, Chornobayiv district, on the root bank of the Sula River, which in the form of a peninsula flows into the waters of the Sula Bay, which arose as a result of flooding after the Kremenchug Reservoir. On its territory there is a forest of artificial origin and a small area occupied by groups of meadow-steppe vegetation. Geographically, this area is located on the slope of the Dnieper-Donetsk basin, where the crystalline rocks are covered by thick strata of the Paleozoic, Mesozoic and Cenozoic. The surface of this tract is a denudation remnant of a forest terrace, greatly altered as a result of soil work. The soil cover is represented by washed and cultivated chernozems and gray forest soils. In the distant past (X-XIII centuries) there was a settlement. The first professional surveys and a description of the remains of this settlement were made in the late nineteenth century V.G. Leskoronsky. The cultural and chronological sketch of the settlement, as a monument of ancient times, was defined in the first postwar years by V.F. Kopilov. Researchers have also suggested the use of the settlement in the XVIII-XVIII centuries for saltpeter fishing. The settlement had three rows of earthen protective structures (shafts). The difference in levels between the rounded area of the settlement with a diameter of about 50 meters and the top of the inner shaft is about 3 meters. The height of this shaft from the outside is about 4 meters, with a width of 10-15 meters. Then the shaft was surrounded by a flood moat up to four meters wide. The difference in height between the bottom of this ditch and the top of the middle shaft is up to 2.3 meters. The width of the middle shaft reached 8 meters. The third outer shaft was up to 2.5 meters high and up to eight meters wide. Together with the ramparts, the diameter of the settlement reached up to 140 meters. Currently, this fortification system is only partially traced, due to significant damage caused by time and subsequent use of this area.

The forest is confined to the steep, sometimes steep (up to 450) slope of the eastern exposure. The stands of artificial origin are dominated by such species as tall ash, common oak, robinia pseudoacacia. Occasionally grow aspen, black poplar, pear, apricot. Introduced breeds, such as sumac and narrow-leaved olive, sometimes grow on the edges. Of the aboriginal shrubs, single-stemmed hawthorn, laxative, and elderberry are noted. The most common species in the region are widespread in the tier of grasses, such as celandine, black feverfew, aniseed, nettle, butterbur. From the actual deciduous species grow reed marten, star anise, European ungulate, yellow vegetables. The area with groups of meadow-steppe vegetation currently covers an area of about three hectares. The upper parts of the elevations of the

microrelief and the slopes of the southern, south-eastern and south-western exposures are mostly occupied by groups dominated by hairy feathergrass, a plant listed in the Red Book of Ukraine. The formation of intermediate wheatgrass predominates on the depressions and on the lower parts of the slopes. Coexist alfalfa, birch, early sedge, chicory, butterbur, butterbur. The bells of Bologna, the eastern bonfire, the Thuringian lavatera, the comfrey, the Pannonian yarrow, the common cutter, and the veronica dibrovna and recumbent often grow. Melitturg bees, as well as euthers characteristic of steppe areas, were found on the legumes growing here. The moss bumblebee listed in the Red Book of Ukraine is also noted.

The general ecological significance of this area for the natural complex of the lower Sula coast is determined by:

a) ensuring the protection of local populations of the above rare and endangered species of flora and fauna;

(b) the conservation of the habitat types important for the maintenance of the region's biogeocenotic diversity, to be protected in accordance with Annex I, Resolution 4 (1996) of the Berne Convention, revised in 2010, in particular:

- G1.2 deciduous forests along river valleys (gallery forests);
- E1.2 groups of perennial xerophilous plants on chernozems (meadow steppes);

c) protection within this object of the hairy feather formation - a group listed in the Green Book of Ukraine. [10].

Botanical natural monument of national importance "Zakrevsky bir"

Announced by the Order of the Council of Ministers of the USSR of October 14, 1975 № 780-r. Area - 105.5 hectares.

Created within the Zakrevsky forestry of the State Enterprise "Smilyanske Forestry". The territory is located in the south-western outskirts of the village of Zakrevky (Baibuzivska village council of Cherkasy district) and has the appearance of a narrow strip located on a low segment of the sandy (pine) terrace of the Vilshanka River and extends from northeast to southwest, parallel to the river valley. ridge. The surface has a flat-wavy character, with hilly and elongated shaft-like elevations, complicated by local depressions on the slopes in the form of sharp saucer-shaped depressions with a general slope from Moshnogorsky ridge to the Vilshanka River, ie from south to north. The parent rocks of the soil are ancient alluvial sand deposits, apparently sent by deluvial ones, which determined the possibilities of forming rich fresh and sometimes dry podzolic soils. In the scheme of physical and geographical zoning of Ukraine, this territory belongs to the Cherkasy-Tyasmin district of the Northern Forest-Steppe region of the Dnieper terrace plain of the Left-Bank-Dnieper province of the Forest-steppe zone. The name of the tract is connected with the name of the settlement

in the vicinity of which it is located. It is known that the forest has grown here since ancient times. According to the stories of old-timers, there were significant areas of age-old forest in Zakrevsky Bor before 1930, in which individual trees of the common oak were 100 and even 200 years old. But starting in 1930, planned logging began here, which lasted until the beginning of the war. During the war, most of the areas with age-old forests were cut down, and timber products were exported to Germany. Currently, the forest, which is part of this object of the nature reserve fund of Cherkasy region, can be described as a pine-terraced oak with mature and ripening plantations of Scots pine of artificial origin. The upper tier of the stand is dominated by Scots pine, aged about 70 years and older, which has been cared for throughout its growth. Some of its trees reach a height of 25-30 m (35 m), while having good vitality. Occasionally in the same tier up to a height of 20-25 m there are common oak, maple, small-leaved linden, smooth elm. In the second tier of the stand is most common hornbeam and many other deciduous species.

In the shrub layer, which is formed on most areas of the massif, black elderberry, common hazel, bird cherry, warty and European cowberry, and blackberry predominate in different areas. Less common are currant, laxative. The tier of herbaceous plants is sparse. It is dominated in some areas by spring bifoliate, yellow vegetables, aster, male dryopteris, hairy hillock, musk adoxa, hairy sedge, lily of the valley. Occasionally, but everywhere, violets grow strange and fragrant, ungulate European, crow's eye four-leaved, Lungwort dark. Pine forests with such grasses as orlyak, goldenrod, Mikel's sedge, reed marten, multi-flowered hedgehog, sandy cardaminopsis, and zubrivka grow in the poorer areas of soil and water nutrition. In the driest variants of such forests in the grassland grow nechuy-wind hairy, stonecrop caustic, stonecrop large, sorrel rowan, bush fragrant. In areas with ancient cuttings, grass groups are formed with a high participation of such ferns as male and Chartreuse shields, female shield. From the group of early spring plants (ephemeroids) there are dense growth, tuberous toothfish, yellow goose onion, yellow anemone.

Rarely you can find spring wheat, small goose onions, snowdrops. Plants that prefer nitrogen-rich soils are quite common throughout the forest. In particular, the background plant in the tier of grasses is nechipai-small-flowered grass. In some areas, dioecious nettles dominate, celandine is large, deaf spotted nettles, horse garlic petioles, and butterbur are intoxicating. In the illuminated areas and among the sparse forests, creeping periwinkle, common praselen, and wall mycelium are often found. On the roadsides of forest roads, groups are formed with the participation of trivial species, such as comfrey, dandelion, butterbur, wormwood and others. The state of dynamic

processes in this forest is primarily determined by the age of its stand. The gradual fall of Scots pine will lead to the transformation of coniferous-deciduous plantations and their transformation into an oak-hornbeam forest with a significant admixture of maple. Mammals in the forest are relatively few. The European roe deer is noted among the raptures. A badger enters this area from the adjacent lands. Common species are forest marten, common fox. The background species among murine rodents are yellow-throated mouse and red fistula, and among insectivorous mammals - common woodpecker. On the edges of the forest were observed mahogany and xylocope - insects listed in the Red Book of Ukraine.

The significance of the natural monument of national importance "Zakrevsky Bir" for the protection and preservation of the natural complex of the Middle Dnieper is determined by:

- representation of deciduous forests typical of the region on the pine terrace, which are reducing their distribution due to the current methods of forestry;

- conservation of the biotope-important habitat types of the region to be protected in accordance with Annex I Resolution 4 (1996) of the Berne Convention revised in 2010, in particular: G1.22 mixed forests involving oak, elm and ash within river valleys .

Zoological natural monument of national importance "Shkola" tract

Announced by the Order of the Council of Ministers of the USSR of October 14, 1975 № 780-r. Area 5 hectares.

This is to the west of the village of Polstvyn, Kaniv district, on the floodplain of the Rosava river, which is limited by a drainage reclamation canal. This object of the nature reserve fund of Cherkasy region was created to protect the local population of beavers, which was formed here after resettlement from the Dnieper islands. The migration was caused by the flooding of the Kaniv Reservoir with the primary habitats of this species on the Dnieper floodplain. Currently, beavers are found here irregularly. The main reason for the relocation of beavers to the village. Martynivka (300 m) there is a significant shallowing of the canal and insufficient fodder base near it. Currently, the main part of this area, namely the flat part of the floodplain, is used as agricultural land for haymaking. In crops, there are often species of meadow-floodplain apophyte plants (residues of natural vegetation) such as buttercup, creeping feverfew, marsh sorrel, sorrel, dioecious nettle, yellow thistle. From spring, seedlings of various types of weeds appear en masse: burdock, wormwood, white quince. The border around the reclamation canal is covered with thickets of wormwood, nettle, echinocystis prickly, boletus edulis, yellow marsh thistle, black elderberry, creeping wheatgrass, spotted hemlock, butterbur, weed, weed. Often in areas with

destroyed turf thickets of hemlock are formed. Within the flooded areas of the ditch there are single-species thickets of coastal aquatic plants. In particular, coastal, sharp and pointed sedges, common reeds, and yellow marsh thistles are noted here. Among them, bog marsh, medicinal feverfew, marsh roosters, wolfhound, meadow willow grow singly. The surface of the water is covered with small duckweed. In the southern part of the tract, a wide strip (up to one hundred meters) is occupied by willow forest, apparently of artificial origin. His stand is dominated by white willow. The age of the trees is about 35-45 years. The second tier is formed by low-growing trees of ash maple and black elder. Herbs are dominated by typical nitrophilous plants, in particular St. John's wort, celandine, urban gravity, dioecious nettle, motherwort five-leaf clover.

The importance of the territory of the zoological natural monument of national importance tract "School" for the protection and preservation of the natural complex of the Middle Dnieper can now be said only in connection with the presence in this area of some important biogeocenotic diversity of the region. in accordance with Annex I of Resolution 4 (since 1996) of the Berne Convention revised in 2010, in particular: C3.41 fragments of Euro-Siberian groups of coastal aquatic vegetation with sedges, reeds, cattails, etc .; G1.11 and fragments of coastal floodplains forests dominated by white willow.

Due to the changes that have taken place in the landscape complex of this area, it has now lost the ability to fulfill the main purpose for which it was created - to protect the local population of the river beaver.

Sofiyivka National Dendrological Park NAS of Ukraine

Sofiyivka National Dendrological Park (Uman, Cherkasy Region) is one of the world's most famous garden and park masterpieces of the late 18th and early 19th centuries, which is on a par with such monuments of park construction as the De Boboli Gardens. Florence (Italy), Sanssouci Park in Potsdam (Germany) and Palace Park in Versailles (France). Its geographical coordinates are 48°46' north latitude and 30°14' east longitude Greenwich Mean Time. The height above sea level in different parts of the park varies from 170 to 216 m. The park was founded in 1796, its area is now more than 180 hectares. As a monument of park construction and architecture of Ukraine, the arboretum "Sofiyivka" is included in the state register of national cultural heritage (approved by the decision of the Board of the State Urban Development of Ukraine 23.12.93 № 12 on the basis of the Resolution of the Cabinet of Ministers of Ukraine from 12.08.92 № 466). Plant collections of the National Dendrological Park "Sofiyivka" by the order of the Cabinet of Ministers of Ukraine dated 11.02.2004 № 73 are included in the register of National

Heritage. According to the Decree of the President of Ukraine dated 28.02.2004 №249 / 2004 "On granting the dendrological park" Sofiyivka "of the National Academy of Sciences of Ukraine the status of national" the park is called the National Dendrological Park "Sofiyivka" of the National Academy of Sciences of Ukraine.

Modern "Sofiyivka" combines the functions primarily of the "Historical Garden", according to the Florentine Charter, the Research Institute of the National Academy of Sciences of Ukraine, the center of introduction, mobilization and acclimatization of plant diversity in the Right Bank Forest-Steppe of Ukraine, educational base, tourist institution, Museum of Landscape Art. The multifaceted significance of Sofiyivka, especially its historicity, requires a deep, scientifically sound approach to its maintenance, restoration, restoration and expansion. During the 216-year history of Sofiyivka, six separate periods of its construction, development, maintenance and becoming a major center of introduction and acclimatization of plants in the Right-Bank Forest-Steppe of Ukraine and a scientific institution of the NAS of Ukraine have been identified. The first period: 1796 - 1832 The park was owned by the Potocki family and from the beginning of construction it was named "Sofiyivka" in honor of the wife of Count Stanislaw Szczeński-Potocki, the beautiful Greek Sophia. The author of the topographic and architectural project of the park was a Polish artillery officer Ludwik Christian Metzel. Under his direct leadership, ponds, locks, fountains and waterfalls, the island of Anti-Circei, the underground river Acheron, bridges, grottoes, the Champs Elysees, the obelisk "Broken Column", the road-alley system, statues were erected.

The Flora Pavilion (1820) was built where the Flora Pavilion is now, and a round wooden gazebo was built on the Belvedere site. Already in this period of construction "Sofiyivka" became a place of concentration of rare exotic plants, as evidenced by the poem by S. Trembetsky "Sofiyivka", which mentions that along with the trees we all know are guests from the Antipodes, Atlas and Lebanon. In particular, during 1796 - 1812 the basis of park plantings was laid by forest-type species of local origin. In the spring of 1799, L. Metzel informed S. Potocki that the planting of local plants was over. Planting of exotic plants continued mainly in the Tempe Valley, on the Champs Elysees and near the grotto of Thetis. Rare exotic plants were brought for big money to Uman via Odessa from Asia, as well as from Italy and the Crimea. Thus, in one of L. Metzel's reports, the owner of the park S. Potocki was informed about the sowing of Crimean walnut, rowan and white acacia seeds in the park. The second period: 1832 - 1859. In 1832 the park, like all the property of the Potocki family, was confiscated and transferred to the Kyiv State Chamber, and from 1836 it was subordinated to the management of

military settlements. The name of the park appears in the literature - Royal Garden.

During this time, the park has undergone significant changes compared to what L. Metzel did in it from the beginning. In 1833, Sadova Street was laid, which connected the park with the city, in 1838, the Main Alley was widened and paved, and water was drained from the center of the park to the Main Entrance. In 1844, two towers in the Gothic style were built here. 1841 - The Mushroom Pavilion and the Chinese Pavilion are installed. 1842 - 1845 - the Flora Pavilion is built according to the project of the architect Rapponet on the site of the previously demolished Rural Pavilion. 1843 - 1845 The Pink Pavilion is built on the island of Anti-Circe. During this time, statues of T. Kosciuszko and J. Poniatowski were removed from the park. After visiting the park in 1847 by Tsar Nicholas I, during 1850 - 1852 the entrance towers, pavilions of Flora and Pink were rebuilt according to the project of Al Shtakenshneider. The Grotto of Apollo was walled up on the terrace of the Moose and the obelisk "Eagle" was installed. This period of construction and development of "Sofiyivka" is characterized by the appearance of publications, from which we see how "Sofiyivka" already then became the center of plant introduction in the Right-Bank Forest-Steppe of Ukraine. Thus, in the first guide to the park, published in Vilno in 1843 by Sylvester Thunderstorm, some tree species that grew then in "Sofiyivka" were named: willow, spruce, pear, birch, poplar, linden, fruit trees, roses. There is also talk about the abundance of flowers that adorned certain areas and planted in vases: oleanders, Chinese roses, carnations and others. It is worth noting S. Groza's report that L. Metzel was assisted in gardening by the German Oliva. The latter probably worked in Sofiyivka and after L. Metzel left for Warsaw in 1812, continued to live in Uman, corresponded with L. Metzel and died here in 1827. More detailed information about the flora of "Sofiyivka" we find in the guide to the park T. Temeri. In describing Sofiyivka, he reports on two old pears and a dozen willows that have survived from the time before, the previous construction of the park, beautiful birches, large poplars, elms, and numerous plantings of local forest trees made by Metzel on high ground.

The precious gift made by S. Potocki by relocating here the first ancestors of the Italian poplar, who gave millions of trees of this type for 50 years and spread from here all over the country, is especially noted. Here T. Temeri is not quite accurate, because this species of poplar grew on the Potocki estate in Tulchyn long before the construction of "Sofiyivka". Talking about the "Sofiyivka" greenhouses, which were built by Potocki, T. Temeri describes a beautiful parterre, broken along the greenhouses, painted with flowers of all varieties. Among the greenhouse plants are named palm trees, fig trees, covered with fruit, fragrant pineapples. Interestingly, most of the greenhouse plants in the

summer were used to decorate the park. Southern plants were skillfully placed throughout the garden. For example, near the stairs of the amphitheater, decorated with exotic plants, there was an orange massif, on the bank of the stream adorned casuarina equisetolista and magnolia large-flowered. Without relying on personal scientific knowledge, T. Temeri turned to the then famous botanist A. Andrzhevsky, who was previously in Uman, with a request to give a note about the plant riches of "Sofiyivka" in order to include it in the guide. Due to the fact that A. Andrzhevsky's note is the first scientific description of the natural conditions and flora of "Sofiyivka", we present its literal translation from French, made by G.Yu. Hraban: "The whole valley of Sofiyivka is located as if in a quarry of natural rocks. The granite of which these rocks are composed forms large deposits of such a mass that it protrudes on the surface of the hills, and its cyclopean blocks accumulate one on top of the other. They are all medium-grained, mixed almost in equal proportions with mica, quartz and feldspar, then grayish, then reddish.

Pomegranates are very rare there, and amphibolites are found in small quantities and only in boulders. Sandstones are not typical of the vicinity of Uman. These gigantic massifs, inexhaustible deposits of granite, which are found at almost every step, provided the genius Metzel with enough material to carry out his classic creative idea. The botanical riches of "Sofiyivka" deserve mention. During Potocki's rule, the greenhouses were divided between Sofiyivka and Tulchyn, which, as the count's residence, should always have had some advantage. But "Sofiyivka" surpassed it in plants and especially exotic trees. You are amazed to see large plane trees, beautiful sights rising above all the other trees on the bank of a stream that flows through the valley, from the grotto of Thetis to the place where it disappears under the mass of rocks, making many bends. Two magnificent Weymouth pines (*Pinus strobus* L.) shade the melancholy terrain of the Champs Elysees. American hawthorn, pawns, chestnuts, weeping ash, thuja, spruce, acacia, buckthorn in groups, then individually enchant the eye and captivate the beauty of its form. The tulip tree, once beautiful, is now renewed from its root and deserves mention. All these wonderful trees belong to the founding period of the garden. Many others who could have increased the size of this list perished during the winter of 1829, but now these losses are being renewed excessively.

The collection of rare plants is constantly growing. The parterre shines with everything that is the most valuable and newest among the flowers. *Gleditsia gorrada*, which grows on the banks of the river, as well as *casuarina equisetolista* and *magnolia large-flowered* from the greenhouse, amazing beauty and grandeur. But is it possible to list all the exotics and all the riches that are collected in the beautiful "Sofiyivka". That would make up a whole volume of the directory and

that's not my goal. The geographical location of Uman gives it an advantage over the entire Right Bank Ukraine, which was called the country of wheat or Egypt of Russia. However, these riches and fertile lands are not a bare steppe. The lands of Uman region are covered with beautiful forests. Sharp-leaved maple, common ash, and many species of elms, alders, lindens, hornbeams, and others make up these forests. There is also plenty of oak there and it takes many miles to grow oak trees. In the very center of the prairies, which are called steppes here, and in these large forests there is a rich vegetation, where the plants of Eastern Europe, Crimea, Siberia are concentrated. What a rich field for botanists! Many of them, having visited the mentioned places, brought with them rich collections about which the scientific world has learned. Also on the territory of "Sofiyivka" all the diversity of the area, all the fullness of the plant world is revealed. The open places there are steppe, massifs of trees, although planted artificially, are no different from natural forests. Finally, the rocks that create the greatest beauty of Sofiyivka serve as illustrated magazines for mosses and lichens and hide a lot of plants that like the shady coolness of granite, the surface of which is covered with hare cabbage and other plants. Despite the optimistic conclusion of A. Andrzhevsky that "... the collection of rare plants grows continuously, and it is impossible to list those rarities and all the treasures of flora that grow in the beautiful Sofiyivka ...", already in the 50s of the XIX century the condition of the plants in the park has significantly deteriorated. This is evidenced by the article about "Sofiyivka" by F. Baziner, which was published in 1851 in the journal of the Ministry of State Property, which notes that the Uman garden in relation to plants can not boast of its wealth. F. Baziner names certain species of plants that grow in the park, these are paulownia imperial, judo tree, edible chestnut, catalpa lilac, Syrian hibiscus, weeping elm, Weymouth pine, Cossack juniper, Canadian spruce, oriental maple, sharp maple deciduous, three-pinned gladiolus, manna ash, glandular islet, sumac deer, forest pine, white poplar, Babylonian willow.

It is reported that these trees are poorly placed and are mostly in completely closed places or in the wilderness, among the dense forest, where they are difficult to notice, and the tulip tree, which is said to have good growth, died two years ago from severe winter. At the same time, the tireless care of the senior authorities and the efforts of the gardener Steiger to improve the condition of the park plantations, breeding on the slopes in front of the greenhouses of the parterre and vineyard, the construction of new greenhouses, experiments on conifers and planting new exotic plants. There are interesting data on greenhouse plants, there are large lemon trees, very beautiful pineapples, which are grown annually up to 3 thousand pieces, peaches, grapes, apricots, fuchsias, justice, pelargoniums, bananas, cacti, myrtles, passionflowers, roses,

canes calciolaria, cineraria, achinomenes, Pontic rhododendron, Indian azalea, Japanese camellia, blue tobacco, strawberry tree, terrible snake, cycad, abutilon, agapanthus, tradescantia. Third period: 1859 - 1929 On March 30, 1859, by royal decree, the park was transferred to the Main School of Horticulture, which was transferred from Odessa to Uman. It continues to be called the Queen's Garden, although by the king's decree, the garden has the official name "Uman Garden of the Main School of Horticulture". VV Pashkevich laid the so-called English Park. In 1923, by a resolution of the Uman District Executive Committee, the park was renamed the "Garden named after the Third International." Care fellings and sanitary fellings are carried out. The park is declining. This period includes the first scientific publications on the flora of the Uman region by famous botanists A. Andrzhevsky, Rogovich and the foreigner Goltz, the latter described 390 species of plants that were found near Uman. From 1882 to 1886 the vegetation of the Uman region was studied by the famous botanist J. Pachosky. He collected a large herbarium, one part of which had 700 species of plants and was stored in the Uman School of Agriculture and Horticulture, and the other in the amount of 1,100 copies was transferred to the Kyiv Society of Naturalists. The results of his research J. Pachosky published in 1886 in the notes of the Kiev Society of Naturalists. This paper lists 1062 species of plants and 20 species and genera of fungi.

The list includes both wild and cultivated plants, indicating the place of growth. For "Sofiyivka" there are 140 species of trees and shrubs, including 92 species of exotics, including 83 species of deciduous and 9 species of conifers marked "and some others". In 1927 in "Tr. s.-g. Botany "published a report of Uman Agricultural College" Tree and shrub species of the park iii International (former Sofiyivka) near Uman ", which gives a brief description of the park and a list of plants of the park, compiled by the park manager S. Bonetsky, who, incidentally, calls the park "The pearl of Ukraine ". The article notes that 494 species, forms and varieties of wood ornamental plants grew in Sofiyivka at that time, including 5 species and 54 varieties of roses, 46 species and forms of conifers and 389 species and forms of deciduous trees and shrubs. In addition, 500 species of plants were grown in greenhouses and hothouses and 300 other flowering plants in the open ground. Thus, despite the great difficulties, the range of ornamental plants in the park not only survived, but also significantly increased compared to 1905. The catalog of trees and shrubs of the Uman Tsaritsyn Garden, which was published in 1905, offers buyers cuttings and seedlings of 646 varieties of fruit species of 16 species, 430 species of ornamental trees, shrubs and vines and 9 species of rootstocks. The fourth period: 1929 - 1955 Resolution of the People's Commissar of the USSR for № 26/630 of 18.05.29 "Sofiyivka" (as already noted since 1923

became known as the Garden iii International) is declared a reserve. The greenhouse, hotbeds and, accordingly, part of the park remain under the jurisdiction of the current Agricultural University. The park was given an independent status, and until 1955 it was repeatedly subordinated to various departments that were established under the Council of People's Commissars of the then USSR. In 1945, the park was given the full name "Uman State Reserve" Sofiyivka ". In 1946, the Council of Ministers of the USSR adopted a special resolution "On the restoration and improvement of the Uman State Reserve" Sofiyivka ". 1 million rubles are allocated for the repair and restoration of the park. In 1948 the general plan of restoration and development of the reserve "Sofiyivka" was approved. In 1949, a decorative nursery on an area of 20 hectares was created to replenish and enrich the park's plantings. Works on repair and restoration of small architectural forms, road-alley system, sculptures of park are actively carried out.

An inventory of trees and shrubs is carried out, scientific works on the history of the park, its dendroflora, sculpture, small architectural forms, etc. appear. During the same period, the original marble sculptures of Apollo Belvedere, Venus the Bath, Mercury, of which copies remain in organic glass, and the statue of Amur, as well as the bust of S. Trembetsky, disappeared without a trace, although later found marble wings from sculptures of Venus Medici, which are now in the museum. Regarding dendrological riches from archival data, it is known that after the Great Patriotic War, 180 species and forms of woody plants have been preserved in the park, although according to O.L. Lindens in 1932 - 1945 in it grew 377 species, forms and varieties of trees and shrubs. In the lists of seeds offered by the park for exchange in 1951, there were only 114 fruit-bearing species and varieties of tree species, and in 1956 - 138 species and forms. Fifth period: from 1955 to 1980, on September 26, 1955, the Sofiyivka Arboretum was transferred to the system of the Academy of Sciences of Ukraine on the basis of Resolution of the Council of Ministers of Ukraine under № 1184 and is subordinated to the Botanical Garden of the Academy of Sciences of Ukraine. In 1958, by the decision of the Cherkasy Regional Council, Sofiyivtsi was given 6.19 hectares of land at the expense of the Uman City Communal Economy and 9.5 hectares at the expense of the Uman Agricultural Institute. In 1972, Sofiyivka was joined by a 5.1-hectare area that had previously belonged to a military unit.

At this time, all wooden steps in the park are replaced by granite ones, violating the integrity of the ground floor amphitheater as a park composition, because instead of serpentine paths, it is crossed by granite steps from the Seven Stream fountain to the greenhouses of the Agricultural Institute (now Uman National University). gardening). The Pink Pavilion is being overhauled with the replacement of the granite

foundation. At the main entrance, instead of a wooden fence on brick columns, an openwork metal fence with granite columns is being built. On the Main Alley, designed by E. Lopushinska in 1974, instead of a brick booth, the composition "Silver Streams" was built of granite. In the same years, the cobblestones of the park were asphalted from the Main Gate to the gate of the Agricultural Institute. This eliminates the round flower bed that was in front of Flora's pavilion. From the bridge to the island of Anti-Circe to the dam on the street. International is laid a landscaped alley with culverts, granite stairs.

During this period, the vegetation of the park was replenished by planting in Grekova Balka, Dubinka, Zvirynka, Arboretum. V.V. Pashkevych, where more than 45 thousand seedlings were planted.

From 1966 to 1972, scientific work was carried out on the introduction and acclimatization of new valuable plants intended for the enrichment of plant resources of the park.

At the end of 1972, there were 550 taxa of woody and shrubby plants in Sofiyivka, of which 497 were deciduous and 53 coniferous. According to the inventory for 1980, about 400 species of plants were found in the park. The sixth period: since 1980 there is a revival of "Sofiyivka" not only in returning certain parts of the park to its original authenticity, restoring them according to historical documents to the form as it was under L. Metzel, but also returning park compositions to their original semantic meaning, which was conceived by the creators of the park, but was eventually lost. In fact, since then Sofiyivka has been gradually transformed into an independent scientific institution of the National Academy of Sciences of Ukraine and a major center of introduction and acclimatization in the Right-Bank Forest-Steppe of Ukraine. This period begins with the natural disaster that befell Sofiyivka on the night of April 4, 1980. The winter of 1980 was harsh and snowless. In March, a lot of snow fell on the frozen ground, and in early April, as a result of active temperature rise, rapid meltwater quickly filled the ponds of the park, which led to the destruction of the dam of the third Krasnostavsky pond, which overcrowded to 30 hectares. A powerful stream of a mixture of water, silt, and ice swept along Sofiyivka, sweeping away small architectural forms, sculptures, bridges, destroying alleys, park compositions, and destroying trees and bushes. In the central part of the park, the height of this stream reached 5-6 meters. Already on April 4, restoration works were actively launched in Sofiyivka. Thanks to the city administration and ordinary citizens of Uman and a small staff of the park, which at that time numbered 80 people together with scientists, more than sixty objects were restored in Sofiyivka in four months, and it was ready to receive its visitors almost by autumn. Since then, every year in "Sofiyivka" works on its restoration, reconstruction and development of the new western part of the park, which was

annexed in the postwar years, are carried out. First of all, the territory of the former military unit with an area of 5.1 hectares is being developed, where the administrative and economic zone of the park is being organized, where the park management and scientists are relocating.

Here 25 garages for cars, tractors and old carriages are practically rebuilt. The equipment maintenance point is being overhauled, and a small laboratory building with rooms for visitors on the second floor is being completed. On the basis of the former ammunition depots, where during the war the Germans built a hospital, the so-called "Revis G03", for Soviet prisoners of war from the Uman pit, a library with a reading room, a dining room for workers and employees with a rest room places, warehouses, gasified boiler house, built a water tower, which supplies water from a well drilled in the western part of the park. A sawmill, a carpenter's shop, a room for keeping horses, sheep and poultry were built. Between 1980 and 1996, 25 families were relocated from the park and eight families improved their living conditions. Today, no family lives in the park and nursery, and this creates ideal conditions for compliance with the park's protected regime. The collection of plants of the National Arboretum "Sofiyivka" has almost 4 thousand taxonomic units, including: about 800 trees, more than 1.6 thousand shrubs and almost 1.5 thousand herbaceous plants [41, 42].

One of the main tasks of the scientific activity of the National Dendrological Park "Sofiyivka" of the National Academy of Sciences of Ukraine is the preservation in artificial conditions in the southern part of the Right Bank Forest-Steppe of Ukraine of collections of living plants, including rare and endangered species. The collection of plants to be protected in the Sofiyivka National Dendrological Park of the National Academy of Sciences of Ukraine includes about 70 species of higher vascular plants, including 67 species included in the current edition of the Red Data Book of Ukraine, 11 from the International Union for Conservation of Nature (IUCN), 8 species - from Annex I of the Convention on the Conservation of European Wildlife and Natural Habitats (Berne Convention) and 6 species from the European Red List. Of the species listed in the IUCN Red List, the collection includes *Androsace koso-poljanskii* Ovcz., *Centaurea taliewii* Kleopow, *Colchicum fominii* bordz, and *Westus saffron*. Elves's snowdrop (*Galanthus elwesii* Hook.f.), Polish larch (*Larix polonica* Racib.), Borisova's sedum (*sedum borissovae* balk.) Czern. Ex Lindem.) Trautv., S. Zaleskii Wilensky), lilac East Carpathian (*syringa josikaea* J. Jacq. Ex Rchb.). Of the species listed in the European Red List, in addition to those already mentioned, there are carnation bluegrass (*Dianthus gratianopolitanus* Vill.) And snowdrop (*Galanthus plicatus* M. bieb.), And of the species listed in Annex I of the Berne Convention, in addition to the two above, there are grouse mountain (*Fritillaria montana* Hoppe), semi-narrow-leaved

(*Paeonia tenuifolia* L.), dream-grass large-flowered (*Pulsatilla grandis* Wender.), dream-grass broad-leaved (*P. patens* (L.) Mill.), feathergrass *Syreyschikova* (*stipa syreistschikowii* P. smirn.), floating water nut (*Trapa natans* L).

Velykoburimsky Park is a monument of landscape art of national importance

The status was granted by the resolution of the board of the State Committee for Nature Protection of the Ukrainian SSR dated December 26, 1989 № 32. Area 86.5 hectares.

The park-monument of landscape art of national importance of the 18th century. Located in the village. Velyka Burimka, Chornobayiv district. Founded in the XVIII century. Prince Bezborodko in the north-east of the village of Burimka, who started planting a forest with alleys of poplar, chestnut and others. In the XIX century. the estate was sold to the famous reformer Prince MM Speransky, who later gave it to his niece - Frolov, married - Cantacuzino. A significant number of tree species were imported from various botanical gardens, from the Crimea - cork oak, dogwood, laurel, peach, from the Carpathians - larch, juniper. A pond was dug in the park, which was filled with underground springs and was called Swan (white and black swans swam here).

The park now resembles a forest: very overgrown with aboriginal species - maple - *Acer platanoides*, maple - *Acer campestre*, smooth elm - *Ulmus glabra*, small-leaved linden - *Tilia cordata*, ash - *Fraxinus excelsior*, although among them are old duplex petiole - *Quercus robur*, white poplar - *Populus alba*, aspen - *P.tremula*, ash - *Fraxinus excelsior*, etc. In total, the park plantations include plants belonging to 21 species, hybrids or cultivars, representing 16 genera and 12 families of trees, shrubs and vines. In the park there are rusty mushrooms on shrubs and grasses, in particular: laxatives, nettle, milkweed. Of the soil macromycetes, *entoloma clypeatum* (Fr. Kumm.), Edible mushroom (*Agaricus bitorguis* (Quél.) Sacc.), Gray manure (*Coprinus cinereus* (Fr.) sF Cray and sparkling (*C. mica*) were observed.) Fr.), *mycena* (*Mycena* sp.).

Kozachansky Park is a monument of landscape art of national importance

Created by the resolution of the RM of the USSR from 29.01.60 № 105. Located in the village. Kozatske of Zvenigorod district on the area of 51 hectares.

Until 1791, the village was owned by Hryhoriy Potemkin, and after his death it was inherited by Varvara Vasylivna Engelgard (Golitsyna), Potemkin's niece and sister of the owner of Bila Tserkva "Alexandria" Oleksandra Vasylivna Engelgard (Branytska). A pseudo-Gothic palace

was built in the central part of the park, and a system of pipes was laid, which fed several fountains and was used for watering trees. A cascade of ponds ran through the entire park. From 1797 to 1801, the Russian poet-biker IA Krylov lived and taught numerous children of the Golitsyn family on the estate. Against the background of natural vegetation, oil plantings of European spruce - *Picea abies*, black pine - *Pinus nigra*, horse chestnut - *Aesculus hippocastanum*, tall ash - *Fraxinus excelsior* and others were made here.

Now the park is largely overgrown with aboriginal vegetation with the participation of maple *Acer platanoides* L., field maple - *A. campestre* L., tall ash - *Fraxinus excelsior* and in its modern form is not very attractive to visitors. Nevertheless, it has preserved the central alley of old specimens of tall ash, which runs through the whole territory, and a large number of old trees of European spruce, black pine, European larch, maple. In total, the park has woody plants of twenty taxa (three are gymnosperms and 17 are angiosperms), which belong to 16 genera of 12 families. The park has a cascade of artificial ponds - ponds and part of the trail network. Under the conditions of reconstruction, it can become quite an interesting object of tourism and a place of rest for locals and visitors.

Decembrist Park is a monument of landscape art

Announced by the Resolution of the Council of Ministers of the USSR of January 29, 1960 № 105. Subordinated to the Kamyansk State Historical and Cultural Reserve. Area 4 hectares.

Park-monument of landscape art of national importance, founded in the late XVIII - early XIX century. in the town of Kamyanka on the right bank of the Tyasmin River. The estate belonged to VL Davydov (1792 - 1855) - one of the leaders of the Southern Society of Decembrists. The Decembrists visited here, OS Pushkin, later - P.I. Tchaikovsky. Of the architectural structures preserved, the grotto (late eighteenth century), green house (early nineteenth century) and water mill (1825), located outside the park.

The basis of the plantations are aboriginal species dominated by sharp-leaved maple - *Acer platanoides* L. There are old specimens of both indigenous (black poplar - *Populus alba*, field maple - *Acer campestre*) and introduced species (western frame - *Celtis occidentalis* Gledichos etc.) as well as a number of taxa planted in the middle of the twentieth century. - garden jasmine - garden jasmine Lemoine - *Philadelphus coronarius* L., *P. x lemoinei* Lemoine, *Viburnum viburnum* - *Physocarpus opulifolius* (L.) Maxim., Tamarisk branched - *Tamarix ramosissima* Ledeb., Low elm and ulmus - *Ulmus* etc.

In total, the park now grows 39 species, hybrids and cultivars of woody plants (2 - representatives of gymnosperms and 37 -

angiosperms), belonging to 28 genera of 21 families. The park is widely represented by various introducers who have reached a high level of acclimatization - the western framework, three-prick spectacle and tannin.

Korsun-Shevchenkivsky Park is a monument of garden and park art of national importance

Proclaimed by the Resolution of the Republic of Ukraine of the Ukrainian SSR of January 29, 1960 № 105. Subordinated to the Korsun-Shevchenkivsky State Historical and Cultural Reserve. Area - 97 hectares.

A park-monument of landscape art of national importance, located in Korsun-Shevchenkivskiyi on several islands and a section of the native bank of the Ros River. The park was founded in 1782 by architect Jean-Henri Munz for the owner of the Korsun eldership, Prince Stanislaw Poniatowski. In 1799 Korsun Palace and Park were bought by Tsar Paul I and presented to Prince PV Lopukhin. After 1918, the destruction of the park began, which in 1925 was named "Park. Lenin. On April 6, 1928, the Cherkasy District Executive Committee declared the park a natural monument of national importance, but this decision was not confirmed by the higher authorities [54].

The plantations of the park include 57 species and cultivars of woody plants (9 taxa - representatives of gymnosperms and 48 - angiosperms), belonging to 35 genera of 21 families. The basis of the park are aboriginal species: maple (*Acer platanoides* L.), field maple (*A. campestre* L.), Tatar maple (*A. tataricum* L.), tall ash (*Fraxinus excelsior* L.), smooth elm (*laevis* Pall.) and others. Valuable are monoculture plantations of lilac (*syringa vulgaris* L.), located on Mount Yantalka and some patches on the banks of the river Ros [37, 38, 39, 40].

The status of the park-monument of garden and park art of national importance allowed to preserve age-old specimens of Weymouth pine (*Pinus strobus* L.) (age - over 200 years, height - 31 m, trunk diameter - 91 cm), Ginkgo biloba L.), (height 12.5 m, trunk diameter - 54 cm), oil plantation of European spruce (*Picea abies* (L.) H.Karst.) (tree height 25–32.5 m; trunk diameters - 86–115 cm), horse chestnut (*Aesculus hippocastanum* L.) (height 16.5 m, trunk diameter - 140 cm), etc. In addition, in the middle of the twentieth century. The plantations of the park were supplemented by a number of introduced species and cultivars - *Robinia viscosa* Vent., Simon's poplar (*Populus simonii* Corr.), *Catalpa speciosa* (Warder ex VEbarney), *Warder ex Engelm.* 'Fastigiata' and so on.

The plantations include 7 species listed in the IUCN Red List of different rarity categories: *Ginkgo biloba* L. - Endangered (endangered), *Alnus glutinosa*, juniper *Juniperus communis*, juniper, *Juniperus virginiana*, western *Thuja occidentalis* - Lower risk / least concern (under slight

threat), walnut *Juglans regia* - near Threatened (close to the endangered state), and juniper *Juniperus communis* L. - to the regional Red List of Cherkasy region.

In addition to artificial plantations, this area is of considerable interest in protecting the biocenological diversity of the region, which should be protected in accordance with the revised Annex I to Resolution 4 (since 1996) of the Berne Convention.

In particular, it is a grouping of xerophilous vegetation on outcrops of crystalline rocks (E_{1.112}). Typical here are groups with a predominance of narrow-legged.

Sosnovyi Bir is a park of national and park art

The status was granted by the resolution of the board of the State Committee for Nature Protection of the USSR №25 of July 27, 1977. Area 39.2 hectares. Located in the north-western part of Cherkasy (Sosniv district). The territory is delineated by the highway H-16 Cherkasy-Kyiv, street Dakhnyvska, which leads to the exit from the city in the direction of Kaniv and street. Palyokhy. The north-eastern part of the park faces the embankment of the Dnieper River. The park is serviced by the Parks Directorate (Cherkasy).

The facility was established in 1967 on the basis of the existing pine-oak forest and artificial plantations of Scots pine, planted by employees of the Cherkasy Forest Protection Station and Dakhnyv Forestry for reclamation purposes. The project of the park was developed by the employees of Ukrdniproinzhprouekt together with the Office of the Chief Architect of Cherkasy. Among the landscaping objects created in recent decades in Ukraine, this park is recognized as one of the best, for which at the review-competition of achievements of Soviet architecture in Moscow in 1972 it was awarded the Honorary Diploma of the Union of Architects of the USSR. Ursatia, VG Gnezdilov, dendrological engineer ED Smirnova in 1979 was awarded the State Prize of the USSR. T.G. Shevchenko.

The territory has an extensive system of track and trail network, divided into a number of functional zones (active and quiet recreation, children's, walking and observation, beaches). The park has a developed infrastructure, good location and is a place of rest for residents and guests of Cherkasy. Festivals, concerts and a summer cinema often take place here. The dendroflora of the park includes 115 species, hybrids and cultivars of trees, shrubs and vines (102 species and hybrids, 13 cultivars), which successfully perform both recreational and phytomeliorative functions, protecting the hilly slopes of the Dnieper from erosion. At the time of creation of the object, 178 taxa of both aboriginal and introduced woody plants were used in its plantations, imported mainly from Trostyanets Arboretum and Sofiyivka Arboretum of the National

Academy of Sciences of Ukraine, some of which were taxodium distichum (L.) Rich. , Banks pine - Pinus banksiana Lamb., Weymouth pine - P. strobus L., dioecious Gymnocladus dioicus (L.) K. Koch, Bretschneider hydrangea - Hydrangea bretschneideri Dipp., etc.) are now lost. However, in the park there are rare among the flora of exotics of the Middle Dnieper taxa, in particular Cladrastis yellow - Cladrastis lutea (F.Michx) K.Koch, maple - Platanus x acerifolia (Aiton) Willd., American linden - Tilia americana L. , rhodotypos kerrioides Ziebold et Zucc. etc. The park serves as a reserve of the dendrogen fund of species that are subject to different degrees of risk in natural systems and need protection. Its plantations include 10 species listed in the IUCN Red List of various rarity categories: apricot - Armeniaca vulgaris and Nedzvetsky apple - Malus niedzwetzkyanaDieck. - Endangered (endangered), eastern biota - Platycladus orientalis (L.) Franco, Cercis canadensis, juniper - Juniperus chinensis, Cossack juniper - Juniperus sabina, juniper - Juniperus virginiana, prickly spruce - Pulp - Thuja occidentalis - Lover risk / least concern (under threat), walnut - Juglans regia - near Threatened (close to the endangered state), and dogwood - Cornus mas L. - to the regional Red List of Cherkasy region [15].

Zoological park

Announced by the Resolution of the Council of Ministers of the USSR of July 22, 1983 №311. Founded on November 14, 1978. The total area for the period of the announcement was - 8 hectares. In fact, after the demolition of the object, the area of the park is 4.37 hectares. Subordinated to the Cherkasy City Council, it has its own administration.

The collection of animals of Cherkasy Zoo includes 2630 individuals of 223 species of wild animals, including: mammals - 28, birds - 44; fish, reptiles and amphibians - 151 species. Among them - brown bear, raccoon dog, porcupine, rhesus macaque, wolf, fox, raven and many others. [28]

The group of invertebrates in the Cherkasy Zoo is represented by two types: arthropods and mollusks. The type of arthropod is represented by three classes: arachnids, bipeds and insects; the type of mollusk is represented by the class of gastropod mollusks.

The collection of birds of the Cherkasy Zoo includes 272 individuals belonging to 13 families.

The pride of Cherkasy Zoological Park are the species listed in the Red Book of Ukraine and the international "red" lists, in particular the steppe eagle, the European lynx, the mandarin duck and others.

The State Zoological Park, as an object of the nature reserve fund, has been declared for the purpose of preserving and studying wild fauna objects in specially created conditions for scientific-educational, cognitive and research purposes.

Chapter 4

Influence of the main negative factors on the state of biodiversity

The impact of the industrial complex.

Atmospheric pollution by industrial emissions from Cherkasy industry since 1960 has caused a chronic type of pollution of forest plantations within a radius of 30 km from the industrial zone of the city. Pine plantations, which are older than 50-60 years, have external signs of weakening, some - a medium degree of damage. The structure of the tree of states is simplified, the forest degrades, peculiar lichens disappear, flora and fauna become poorer. Recently, emissions of pollutants into the atmosphere have decreased in volume, but, given the chronic type of pollution, the consequences are tangible.

The problem of accumulation, collection, processing, utilization, removal, disposal and disposal of waste is one of the acute problems of the functioning of any settlement. Production and consumption wastes, when they accumulate, are a source of significant environmental hazards and social tensions. The amount of solid waste generated is constantly increasing, and their composition is changing, which is associated with the use of new packaging materials, both domestic and foreign.

An important problem in the region is related to the accumulation of waste in the places of its generation.

Due to the lack of technologies for processing most of the waste and unsatisfactory funding of measures in the field of waste management, aimed primarily at their disposal and utilization, a significant amount of such waste accumulates in the places of their generation.

The location of the city landfill in the heart of the Cherkasy forest led to the pollution of the forest and the drying up of forest plantations on a large area.

The choice of the road for garbage transportation was made without taking into account the requirements for the provision and protection of animal migration routes. Due to non-compliance with the rules and technology of landfill operation, the number of predatory harmful species of animals (foxes, stray dogs and cats, crows and others), which harm all other species of animals, has increased.

The sources of pollution of water bodies are sewage treatment plants and sewerage networks of production departments of housing and communal services. Of the 38 treatment complexes operating in the region, more than half need reconstruction. There are no sewage treatment plants in five districts of the region. These are Horodyshe, Drabiv, Zhashkiv, Korsun-Shevchenkivsky and Shpolyansky districts [45].

Impact of energy and transport. One of the important environmental problems in the region is air pollution with harmful emissions from vehicles, including oxides of carbon and nitrogen, hydrocarbons, lead

compounds. Emissions of harmful substances are concentrated along the main transport arteries.

The construction of the Kyiv-Odessa highway has created a number of obstacles to animal migration, creating a barrier effect and fragmenting the ecosystem.

Impact of agricultural production. High plowing, degradation of the system of protective plantations, pollution of agricultural landscapes with wastewater, pesticide residues, which are stored in the warehouses of the former KSP and are potential pollutants.

In recent years, the volume of organic and mineral fertilizers and plant protection products has sharply decreased. But the chemicalization of agriculture, which was carried out in previous years, was accompanied by negative consequences for the environment.

Information on the quality of soils in the region is presented in table 14.

14. Quality of agricultural soils within Cherkasy region

№ п/п	Name of districts	Humus content, %	Weighted average nitrogen content, mg / kg	Phosphorus content, mg / kg	Potassium content, mg/kg	% of acid soils (rNKSI 4.0-5.5)	Ecological agro-chemical assessment, score
1	Horodyshche	2,99	105,1	143,0	72,0	17,3	56,0
2	Drabivsky	3,83	137,8	112,0	66,0	2,9	57,6
3	Zhashkivsky	3,39	133,9	133,0	94,0	4,7	63,0
4	Zvenigorodsky	2,80	110,1	137,0	90,0	38,5	55,7
5	Zolotonosha	2,97	120,8	127,0	68,0	12,7	54,7
6	Kamyansky	2,79	115,2	131,0	80,0	13,4	55,6
7	Kanivsky	2,29	84,6	126,0	60,0	32,6	44,6
8	Ekaterinburg	3,37	126,2	108,6	93,2	20,4	55,9
9	Korsun-Shevchenkivsky	2,30	85,9	146,0	70,0	30,5	51,1
10	Lysyansky	3,09	120,4	125,9	87,6	14,5	57,9
11	Mankivsky	2,88	119,9	153,0	108,0	22,8	62,0
12	Monastyryshchensky	3,21	128,1	153,0	89,0	36,3	61,1
13	Smilyansky	2,58	98,3	126,0	87,0	23,4	49,7
14	Talnivsky	3,38	135,9	110,0	98,7	9,2	60,5
15	Uman	3,29	145,7	121,1	109,6	37,1	62,0
16	Khrystynivsky	3,26	131,5	148,0	94,0	27,4	64,3
17	Cherkasy	2,42	93,2	158,0	62,0	42,0	50,5
18	Chyhyrsky	2,27	101,2	99,0	66,0	39,6	42,8
19	Chornobayevsky	3,23	122,1	102,0	66,0	13,1	52,1
20	Shpolyansky	3,21	129,6	132,0	92,0	12,6	58,9
	By region	3,05	120,5	129,0	83,9	20,9	55,3

One of the characteristic signs of soil degradation is the presence of a significant amount of acidic soils with all the negative consequences. During the period of intensive chemicalization of agriculture, the use of mineral fertilizers led to an increase in soil acidity. In contrast, 100-120 thousand hectares of soil were limed annually at the expense of the state and local budgets, which ensured the relative stabilization of acidity. After 1990, liming stopped due to lack of budget funds, now it is liming about 6-12 thousand hectares per year, only at the expense of land users. Lack of equipment for a complex of works for land cultivation in general, and erosion-hazardous areas, in particular, further intensified soil degradation processes. As the balance of mineral nutrition showed, the deficit in the region's agriculture in 2018 averaged 152 kg of nutrients per hectare of arable land. In a quarter of arable land where erosion dominates, these losses are much higher. [3, 24].

The program on protection and increase of soil fertility of the Cherkasy region "Fertility 2016-2020" is developed on counteraction to degradation processes in soils.

Forest management system. Due to the intensification of forestry, the anthropogenic impact on forests has increased. Modern forestry technologies include mechanized both continuous (main use felling, sanitary, reforestation) and selective (care felling) felling. Annually in the region continuous fellings make more than 1000 hectares that leads to temporary fragmentation of forests. The use of powerful equipment in skidding and removal of wood - to the destruction of vegetation and subsequent change of species. During forest care fellings, which are carried out annually on almost 17 thousand hectares, stands are liquefied, the lighting of the soil cover changes, the species composition changes, remeses are destroyed, and fauna is disturbed.

Burning of dry natural vegetation and forest fires. During the last 5 years the number of cases of burning of dry wetland vegetation and hayfields, as well as the volume of forest fires has significantly increased.

Fires cause significant damage to natural ecosystems, reduce the number of many insects, birds, animals, lead to changes in vegetation

According to statistics, almost 100% of forest fires occur through no fault of man, due to his negligence, and a very small part as a result of natural factors.

Impact of hunting management. Hunting management has become much more complicated in the last decade due to frequent changes of users, fragmentation of large farms, insignificant investment of material resources in hunting management. The study and comparison of the dynamics of the number of the main species of hunting animals shows a decrease in their number. Neglecting the patterns of development of natural systems also harms plant resources. Thus, the artificial increase in the number of wild boar on the territory of MH "Trakhtemyrivske" led to the

almost destruction of the population of fingerlings, whose tubers were dug by wild boars. In non-free and semi-free conditions, wild animals are kept both for release "under fire" and in order to increase the number in the wild. Most hunting farms in the region do not have scientifically sound calculations of the optimal number of such maintenance. The number of some species of animals is close to the critical one in which there is a probability of related crossbreeding and reduction of genetic diversity [25, 26. 27].

Other factors of influence. Among other factors of negative impact on biodiversity it is necessary to note such as excessive use of wild plants as medicinal and food raw materials, grazing of cattle, plucking of flowers on bouquets, poaching and predation in relation to animals, land reclamation, others.

One of the most important components of the region's bioresources is the stocks of fish and other objects of water fishing.

According to the Red Book of Ukraine, the following species of Red Book species of round-mouthed fish and fish are represented in the Dnieper basin: Ukrainian lamprey (*Eudontomyzonmariae*, Bern, 1931), sterlet (*Acipencerrutenus*, Linnaeus, 1758) and Dnieper madder (*Barbusbarusborysthenicus*, Dybowsri, 1862).

Almost all inland freshwater reservoirs - rivers, lakes, reservoirs, technical reservoirs are actively developed by the extractive industry. In recent years, there has been a clear trend in most water bodies to reduce the total catch of fish, to catch other objects of water fishing or to worsen the species and quality of fish catches.

Trends in biodiversity change and ways to mitigate the threat of negative impacts

Peculiarities of the current state of biosphere development are unrestrained anthropogenic impact on all, without exception, levels of existence of biological organization - from subcellular, cellular to ecosystem and landscape. Intensive development of energy, resource-intensive industrial technologies, regulation of river runoff, urbanization, extensive agriculture and forestry, hunting and industrial fishing, expansion of recreational areas, military activities and more have significantly intensified the threat to biodiversity.

Sources of threats to biodiversity can be both natural and anthropogenic factors, with the latter clearly predominating. The most common reasons for declining numbers and species diversity are:

- § destruction of places of distribution of animals and plants as a result of economic activity;
- § pollution of the natural environment;
- § irrational fishing and poaching;
- § continuous deforestation;

- § forest fires;
- § insufficiently developed network of protected areas;
- § lack of integrated management and a unified system of biodiversity protection;
- § through country and ancillary construction on and near wildlife habitats.

Geographical location, climatic conditions of Cherkasy region led to the formation of various vegetation in the region and create conditions for the habitat of many species of animals.

Unfortunately, due to the fragmentary nature of scientific research, there are currently no updated data on the diversity of flora and fauna of the region.

Ways to mitigate the threat of negative impacts on biodiversity.

The following measures should be taken to ensure the protection, conservation and reproduction of biodiversity:

- improving the state of conservation of natural and semi-natural habitats of biodiversity by declaring the territories and objects of the NPF;
- allocation of structural elements of the regional ecological network on the territory - drawing borders on cartographic materials, obligatory consideration in development of general schemes of development of settlements, other town-planning documentation and any regional programs on protection of lands, forests, rivers, etc .;
- conducting a biota inventory and providing a sociological assessment of species in need of protection. Particular attention should be paid to endemic species and the definition of the list of species of wild plants that should not harm other living beings within the region;
- monitoring of rare types of natural environments and species of flora and fauna. Organization of an ecological monitoring system, the task of which is to collect, process, accumulate and transmit information on the state of ecosystems and the dynamics of external factors affecting them with further forecasting of possible schemes of ecosystem development in time and space, substantiation of management decisions on conservation and restoration of natural resources. Establishing environmental monitoring of landscapes is the coordination of sectoral monitoring programs that monitor individual components of the landscape;
- identification of local, national and global priorities for biodiversity protection;
- Involvement of citizens' associations in solving issues of protection and conservation of biodiversity.

•development of a local (elementary) model of the ecological network for each landscape, where long-term or even temporary conservation of the species is possible. The location of the elementary parts of the ecological network should be determined primarily by the presence of rare and endangered species that have state, European or world protection status. The local ecological network should include forests and forest belts, ponds, lakes, swamps, field edges as migration routes, and recommendations should be developed for the optimal structure of field edges in agro-landscapes of different natural zones. It is necessary to plan the restoration of agrobiodiversity of degraded areas. It is advisable to provide for the creation of "steppe" and "meadow" links of the ecological network, preservation of existing and creation of new draws among fields (meadows and steppes, beams, small ponds, swamps, thickets of bushes and trees, quarries, landfills, etc.).

• preservation of existing and creation of new eco-corridors along highways and dirt roads, drains, incl. reclamation canals, as well as buffer (unploughed) strips around reservoirs, forests also between fields. In order to reduce the risk of biota disturbance, the construction of dirt roads along forests, water bodies and other natural and semi-natural groups should be prohibited. When building highways with embankments, provide for the creation of crossings for animals under the road.

In order to reduce the anthropogenic load on ecosystems in agriculture, the following measures should be taken:

improve land structures;

• to introduce soil protection systems of agriculture with contour-ameliorative organization of the territory;

• rehabilitate disturbed lands with the application of landscape and ecological principles;

• preserve degraded agricultural lands;

• create a system of protective forest plantations;

• transfer some fields to hunting grounds;

• prohibit the plowing of any areas that have not been plowed in the last 10-15 years;

• establish compensation for unharvested crops in agricultural areas to preserve nests and broods of hunting species, and penalties for their destruction;

• ensure the use of soil-saving technologies (dumping), reduction of chemical pressure on fields (use of agronomic methods of pest and weed control, biometrics and organic fertilizers, ban on hazardous chemicals);

•ensure the application of proper crop rotation with a significant participation of fodder perennial grasses, with the cultivation of a large

number of different crops, especially fodder for wild animals: oats, peas, potatoes, wheat. When harvesting, the movement of the units should be directed from the center of the field to its periphery;

- wide use of means of biologization of agriculture (perennial grasses, expansion of areas of legumes, use of biological preparations that stimulate nitrogen-phosphorus nutrition;

- to achieve a reduction in the size of the fields and the placement of their contours beyond the soil-relief boundaries. To substantiate the areas of rational use of land resources of the region and the implementation of economic and technological measures to reproduce their natural and ecological functions, it is necessary:

- summarize information on agricultural land in order to clarify the size of areas that have undergone intensive erosion, salinization, flooding, loss of fertility and other processes that worsen the condition of land, to identify areas that are in crisis;

- update maps of the quality of land, in particular agricultural and forestry use;

- organize monitoring of lands, reference stationary areas for monitoring of negative processes in all landscape-ecological areas;

- to ensure the resumption of works on soil liming, using local materials (defect, marl, sapropel, etc.);

- application of organic and mineral fertilizers only on the basis of ecological and agrochemical passports of fields that provide high payback of fertilizers;

- use the productive soil accumulated on the territories of sugar factories of the region, in the fields of agricultural enterprises;

- introduction of soil-protective agriculture with contour reclamation organization of the territory, develop specific programs for districts and individual farms, regardless of their form of ownership and management.

To reduce the level of anthropogenic pressure on ecosystems, in particular their pollution by emissions of pollutants from the industrial complex and settlements, it is necessary to take the following measures:

- ensuring the implementation of environmental impact assessment in the decision-making process on the planned activities in accordance with the requirements of Article 3 of the Law of Ukraine "On Environmental Impact Assessment"

- cessation of new industrial construction, not directly related to meeting the needs of the population in cities and towns, with increased levels of environmental pollution, primarily to carry out reconstruction and technical re-equipment of existing industries using the latest technological processes;

- Continuation of the inventory of sources of air pollution and assessment of pollutant emissions from stationary and mobile sources, as well as the inventory of discharges of domestic wastewater at facilities located in the region and in the basins of small and medium rivers;

- achieve a reduction in emissions of pollutants into the atmosphere from stationary and mobile sources of emissions through the implementation of measures to protect the atmosphere; • in the coming years to achieve the cessation of discharge into rivers and reservoirs of untreated wastewater;

- make the transition to economic methods of nature management, economic incentives for the rational use of water resources, environmentally friendly production, enterprises for the processing of industrial and household waste.

In order to preserve the lands of the water fund and water resources:

- ensure compliance with the degree of wastewater treatment and bring them to the established norms and standards;

- complete the construction and reconstruction of buildings for facilities whose activities affect the ecological status of small and medium-sized river basins;

- arrange water protection zones and coastal protection strips along rivers and reservoirs, strengthen control over compliance with the ban on the use of sustainable and potent pesticides, storage and use of pesticides and fertilizers; arrangement of cemeteries, cattle burial grounds, landfills, filtration fields, manure storages, accumulators of liquid and solid production wastes, etc .; discharge of untreated wastewater using the terrain (beams, lowlands, quarries, etc.), as well as streams; plowing of lands, as well as horticulture and vegetable growing; arrangement of summer camps for cattle; construction of any structures (except hydraulic, hydrometric and linear), including recreation centers, cottages, garages and parking lots; washing and maintenance of vehicles and equipment;

- strengthen control over the observance by economic entities of the requirements of environmental legislation.

Conditions and requirements for forestry:

- increase the ecological role of forests as filters of polluted landscapes and indicators of environmental quality;

- assess the state, ways of conservation, reproduction and sustainable use of biodiversity of forests and other landscape ecosystems;

- in order to improve the living conditions of the population, the area of forests should be increased both at the expense of the forest fund

and afforestation of lands, low-productive degraded lands, withdrawn from agricultural and other uses;

- Adequate protection and preservation of forest ecosystems under anthropogenic pressure should be ensured by zoning forests according to the degree of their degradation, developing a system of recommendations for ecological regulation of anthropogenic loads, increasing forest resilience differentiated by types (complexes) of anthropogenic and natural and areas of degradation of forest ecosystems.

An effective means of overcoming the environmental crisis in Cherkasy region should be to strengthen educational activities in the field of protection of the natural environment, constructive cooperation of specially authorized authorities in this area, authorities and local governments with all environmental environmental movements, promoting a holistic policy on environmental education, environmental education. and advocacy of environmental knowledge.

It is expedient to create new and involve functioning public ecological expert centers in activities aimed at public awareness of the importance of the problem of conservation of landscape diversity, habitats of plant and animal species.

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UDC 502.7.502.4

Protected area in Ukraine

Scientific publication

Olexander Boiko
Olexeii Gonchar
Oleksandr Havrysh
Tetyana Osokina

ISBN

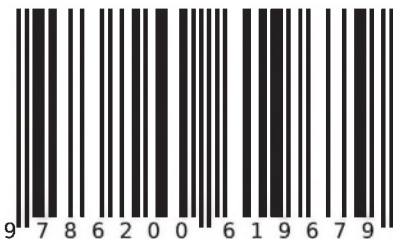
The authors will be grateful for feedback that can be sent to: Cherkassy experimental station of bioresources NAAS, street Pasterivska, 76, Cherkasy, 18015, Ukraine e-mail: of.gonchar@gmail.com

Signed for printing 02.02.2021. Format 60x84 1/16 Circulation 300 copies. Offset paper. The original model was made at the Cherkasy research station of bioresources NAAS

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The role of nature reserves in the conservation of biodiversity in a market economy is fundamental and basic. Conservation of nature reserves is ensured in various ways, including conducting comprehensive research to develop a scientific basis for conservation and efficient use. Biodiversity is the basis of renewable natural resources, regardless of material value, as it ensures the functioning of natural ecosystems. Biodiversity loss not only leads to negative economic consequences, it causes disruption of natural living conditions for all species of biota and for humans. Therefore, it is important to constantly study the state of landscapes, biotic and biotic resources, identify areas of special value and species in need of protection in order to develop and implement measures to mitigate anthropogenic impacts. The monograph is devoted to these questions.

The book was prepared by a team of scientists from the Cherkasy Research Station of Bioresources of NAAS of Ukraine. The authors express their sincere gratitude to the employees of the research station, E. Tkach, V. Usenko, Y. Sotnichenko, M. Nebylytsia for their help in conducting field expeditions and processing the research results.



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