

# MEZYN NATIONAL NATURAL PARK AS A CENTRE OF FOREST PHYTODIVERSITY MAINTAINANCE OF NORTH-EASTERN UKRAINE

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## Abstract:

Mezyn National Natural Park is in the north part of the Korop District of the Chernihiv Region, 310 km<sup>2</sup> in area, is characteristic for its strongly dismembered landscape that stipulates presence of varied localities, among them there are exterminated glaciofluvial plains, slopes and super streamside terraces. Aim of research included an expose of the value of the Mezyn NNP in maintenance of forest diversity of vascular plants and forest communities. In the Mezyn NNP there are 772 species of spontaneous flora, 194 species of the cultivated flora and 18 rarity species. The rarest species are concentrated in the centre and the east, prats of the park richer in vegetation cover. In the forest group of the Mezyn NNP 10 species of vascular plants are recordered in the Red book of the Ukraine. The wooden territory of the Mezyn NNP presents 38% and provides the variety of ecotopic terms after they provides a wide spectrum of representation and protection of forest species of vascular plants and corresponding phytocommunites.

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**Key words:** plant variety, protection, forest communities, spontaneous flora, Mezyn National Natural Park

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## INTRODUCTION

The Mezyn National Natural Park (UA 000038, Emerald of network of Ukraine) is located in the northern part of the Korop district in the Chernihiv Region. This park was established by the Order of the President of Ukraine No. 122 on February 10, 2006. The area of the National Natural Park is 310 km<sup>2</sup>, 85.43 km<sup>2</sup> of which is in regular usage. NNP is subordinated to the Ministry of Ecology and Natural Resources of Ukraine. Flora researches in the territory of the park were conducted in the 1980s by Andriienko (2008) and Ustyomenko (1984). Summarizing monograph by Andriienko and Sheliah-Sosonko (1983) is a unique indicator of the development nature reserves for the decades and there are some materials concerning projecting of the territory of Mezyn NNP.

Natural vegetation on the territory of the Mezyn National Natural Park has not undergone significant changes as a result of human activity. Cenotic diversity makes up over 50 plant associations. Wooden territory occupies 38% of the National Natural Park, meadows make up 16%, moors 1% and water bodies 3%. Watershed area are plowed and occupied by farmlands (35%), buildings and roads present 7% of the park. Mezyn NNP takes a leading place in ecological network of Novhorod-Siverskyi Polissia and Chernihiv region and stand as ecological core of the national level in national ecological network of Ukraine (Karpenko *et al.*, 2017).

## NATURAL CONDITIONS OF THE RESEARCH AREA

According to the physical and geographical zoning (Ecological Encyclopedia, 2006) the territory of Mezyn NNP belongs to the Novhorod-Siverskyi Polissia, Polissia region of mixed-forest coniferous-wet moderately warm zone. According to the geobotanical zoning the territory belongs to Novhorod-Siverskyi Ponornytsia region of oak-pine and oak forest and flood meadows of Chernihiv Novhorod-Siverskyi (Eastern Polissia) district of oak-pine and pine forest of the East European Province of the European broad-leaved forest region (National atlas of Ukraine, 2008).

The territory of Mezyn NNP is located within the Ponornytsia forest island, the biggest one in the Ukraine along the Desna River. In hypsometric sense, the territory is an elevated plain at altitudes from 212 m to 125 m a.s.l. (National atlas of Ukraine, 2008).

Landscapes of the Mezyn NNP represent transitions from wooded to forest steppe and this territory is the most eroded is rich for bare primary rocks. The valley of the Desna River and its right-bank tributaries, hollows and ravines is incised in a thick Anthropogenic and Paleogene deposition and runs into a thick chalk deposition. The main soil-forming rocks are loess loams that are underlain by a till. A soil cover of the Mezyn NNP is predominated by

gray podzolized silty-sandy loams, turfy podzolic sandy loam and podzolic chernosem soil in upland areas. In a floodplain part of the NNP the soil cover is quite diverse and particularly varies from alluvial-turfy to peat-bog soils. The territory of the Mezyn NNP is characterized by highly dissected landscape that results in various land territories such as morainic water-iced plains, slope territories, floodplain terraces, modern river floodplains and erosion network.

## HISTORY OF RESEARCHES

Researches results are based on generalization of the authors' and reported data on forest phytodiversity in the Mezyn NNP (Ustymenko, 1984; Panchenko, 2006; Andriienko, 2008; Karpenko, 2009, 2016). The territory of NNP was partially studied at different times. There are three periods in the history of vegetation researches of the region within the territory of the national park: the first from the middle of the 18<sup>th</sup> century to the beginning of the 20<sup>th</sup> century, the second period includes a beginning, middle and end of the 20<sup>th</sup> century, the third period starts at the beginning of the 21<sup>st</sup> century.

Modern study of the vegetation of the national park as an object of the Nature Reserve Fund of the Ukraine is generally connected with researches of the nature reserve fund of the Chernihiv Region and particularly the Polissia Region (Phytodiversity of Ukrainian Polissia, 2006; Andriienko, 2008; Karpenko, 2009; Lukash, 2011). Flora studies of the territory of the Mezyn NNP began in 1992 (Karpenko, 2016).

## RESULTS AND DISCUSSIONS

In the territory of Mezyn NNP forest vegetation is represented mainly by oak, lime-oak and maple-lime-oak forest, in which *Quercus robur* L. always forms the first stage with admixture of other species. *Tilia cordata* Mill. and *Acer platanoides* L. make the second stage. The communities are represented by oak, lime-oak, maple-lime-oak, lime, hornbeam-oak ("Rykhlivska Dacha" Landscape Reserve) and ash-tree ("Vyshenska Dacha" Botanical Reserve) subformations.

Oak forest occupies large area in the central part of the Mezyn NNP on slopes of ravines and hollows of different exposition, 5° to 30° steep and also covers the plateau on unplowed territories. In the oak forests medieval and ripening forest predominates with small amount of mature oak forest. Tall (up to 5 m) *Corylus avellana* L. forms a thick undergrowth. Depending on the ecological conditions there are *Aegopodium podagraria* L., *Stellaria holostea* L., *Carex pilosa* Scop. and *Galium odoratum* (L.) Scop.

Main massifs of lime-oak and maple-lime-oak forests are located within the natural boundaries near the village of Velykyi Lis and takes narrow dry inter creek spires steep (25–35°) slopes. Medieval and ripening forests predom-

inate; medium-bonitet and high-density trees are clearly two-storey. The oak with admixture of *Fraxinus excelsior* L. forms the first stage. The second stage is lower and formed by *Tilia cordata* and *Acer platanoides*. Thick and high undergrowth is made by *Corylus avellana*, *Aegopodium podagraria* and *Carex pilosa*.

The hornbeam-oak forest occur in the western part of the park, among them *Carpineto-Querceta caricosa (pilosae)* are the most widespread associations, which are located on glacial deposits. The derivatives of the hornbeam-oak forest are widespread in the natural boundary of the "Rykhlivska Dacha". Thick one-lstorey forest in various proportions is formed by *Carpinus betulus* L., *Quercus robur*, *Fraxinus excelsior*, *Populus tremula*, *Betula pendula*, *Tilia cordata*. The territory of NNP is the last on the eastern outpost with increase of *Carpinus betulus*.

Structure of sinusia of spring ephemerooids includes 5–7 species, among them *Anemone ranunculoides* L., *Ficaria verna* Huds., *Corydalis cava* (L.) Schweigg. et Koerte, with predominating *Dentaria bulbifera* M. Bieb., *Gagea lutea* (L.) Ker Gawl. and *Gagea minama* (L.) Ker Gawl. *Corydalis intermedia* (L.) Merat, *Corydalis solida* (L.) Clairv and *Adoxa moschatellina* L. Are rare and *Chrysosplenium alternifolium* L. grows in the wet forest areas.

Original forests of the Mezyn NNP belong to the group of *Fagetalia sylvaticae* Pawlowski 1928 according to the flora classification (Phytodiversity of Ukrainian Polissia, 2006) Also one association of hygrophilous forest (Ficario-Ulmetum) and two associations of mesophilous forest (Stellario holostea-Aceretum platanoidis of the union Quercus roboris-Tilion cordatae and Galeoptodonilutei-Carpinetum of the union Carpinion betuli) were distinguished.

In the old cuttings of original oak, lime-oak, maple-lime-oak forests derived communities represented by aspen-birch broad-leaved forest were formed and are located mainly in the eastern part of NNP and birch forests grow in its northern part.

The alder forest typical for the Left-bank Polissia is located in the territory of NNP on the terraced down hills and also on the down hills of passing valleys of small rivers (Studynka, Khvorostynka, Voskovukha, Kryska, Bystrytsia), the tributaries of the Desna River. Erosion-preventive plants *Betula pendula* Roth. and *Robinia pseudoacacia* L. are widespread in the territory of the park which was planted predominantly on slopes and edges of ravines. Natural regeneration of the original communities with nemorose, boreal and meadow takes place in cultures of birch. Floristic poor communities with participation of *Urtica dioica* L., *Chelidonium majus* L., *Galium aparine* L. and *Impatiens parviflora* DC form in cultures of robinia with undergrowth with *Sambucus racemosa* L.

Forest communities found in the park were recorded in the Green book of the Ukraine: group of associations *Pineta hylocomiosa* in the northern part of the park, group of associations *Querceto-Pineta corylosa* in the northern part of the park, group of associations *Querceta (roboris) corylosa*

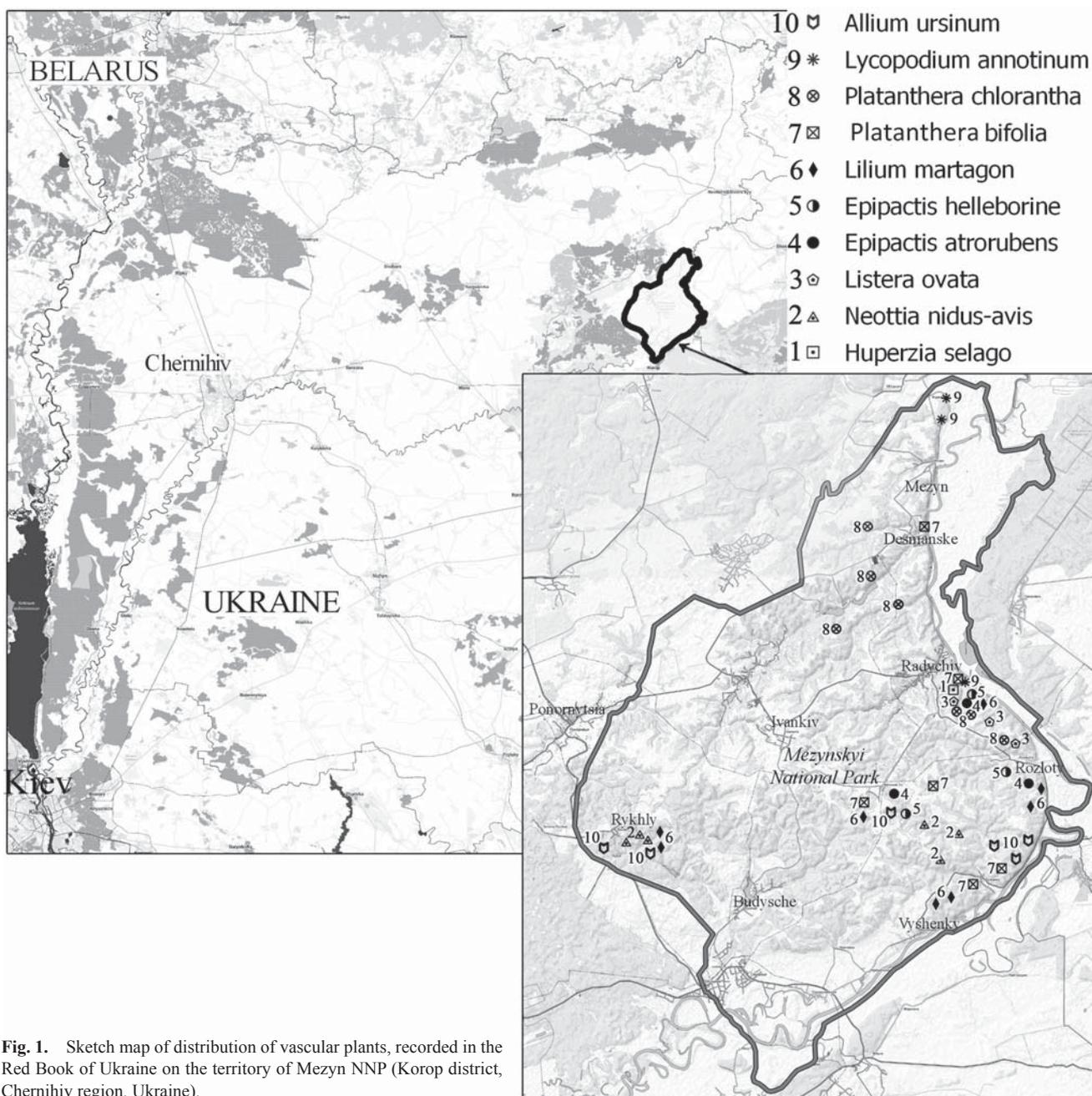


Fig. 1. Sketch map of distribution of vascular plants, recorded in the Red Book of Ukraine on the territory of Mezyn NNP (Korop district, Chernihiv region, Ukraine).

in the southern and central part of the park; associations *Carpineto-Quercetum caricosum (pilosae)* and *Carpineto-Quercetum aegopodiosum* in the “Rykhlyvska Dacha” landscape reserve of national significance; associations *Tilieto (cordatae)-Quercetum (roboris) caricosum (pilosae)*, *Tilieto (cordatae)-Quercetum (roboris) aegopodiosum*, *Acereto (platanoidis)-Tilieto (cordatae)-Quercetum (roboris) aegopodiosum* in the central and eastern part of the park. In total, 772 species of spontaneous flora, 194 species of the cultivated flora and 18 species of rarity group grow in the territory of the Mezyn NNP.

While studying flora of Mezyn NNP for the period of 1980–2016 a number of rare species were discovered that gives the territory a special scientific value (Andrienko, 2008; Karpenko, 2009, 2016). The rarest species are concentrated in the centre and the east, richer after a vegetable

cover, parts of territory of park. From the forest group of flora of the Mezyn NNP to the Red book of the Ukraine, 10 species of vascular plants are brought: *Huperzia selago* (L.) Bernh ex of Schrank, *Lycopodium annotinum* L., *Neottia nidus-avis* (L.) Rich., *Listera ovata* (L.) R.Br., *Epipactis atrorubens* (Hoffm. ex Bernh.) Besser, *Epipactis helleborine* (L.) Crantz, *Platanthera bifolia* (L.) Rich., *Platanthera chlorantha* (Cust.) Rchb., *Lilium martagon* L. and *Allium ursinum* L. (The Red Book of Ukraine. Flora world, 2009; Karpenko, 2016). Their distribution and representation within the territory of the Mezyn NNP is as the following (Fig. 1).

*Huperzia selago* (Fig. 2) is represented by a single local population with the area of about 0.5 m<sup>2</sup> on the northern slope of a ravine, about 2 km to the south from the Radychiv village. *Lycopodium annotinum* is (Fig. 3) is spo-



Fig. 2. *Huperzia selago*.



Fig. 3. *Lycopodium annotinum*.



Fig. 4. *Neottia nidus-avis*.



Fig. 5. *Listera ovata*.

radically widespread in the cenosis of a light green-mossy pine forest, partially gramineous green-mossy in the northern part, at the outskirts of Mezyn, Kurylivka and Radychiv villages. The communities of *Lycopodium annotinum* are spread on the edge of the right bank of the floodplain terrace in the pine forests. *Neottia nidus-avis* (Fig. 4) is scattered in the cenosis of a broad-leaved forest (natural boundaries of Rykhlivska Dacha, and Vyshenska Dacha). *Listera ovata* (Fig. 5) is represented mainly by a small number of populations, but in places 40–50 specimens could be found (near Radychiv and Rozlety villages). *Epipactis*



Fig. 6. *Lilium martagon*.

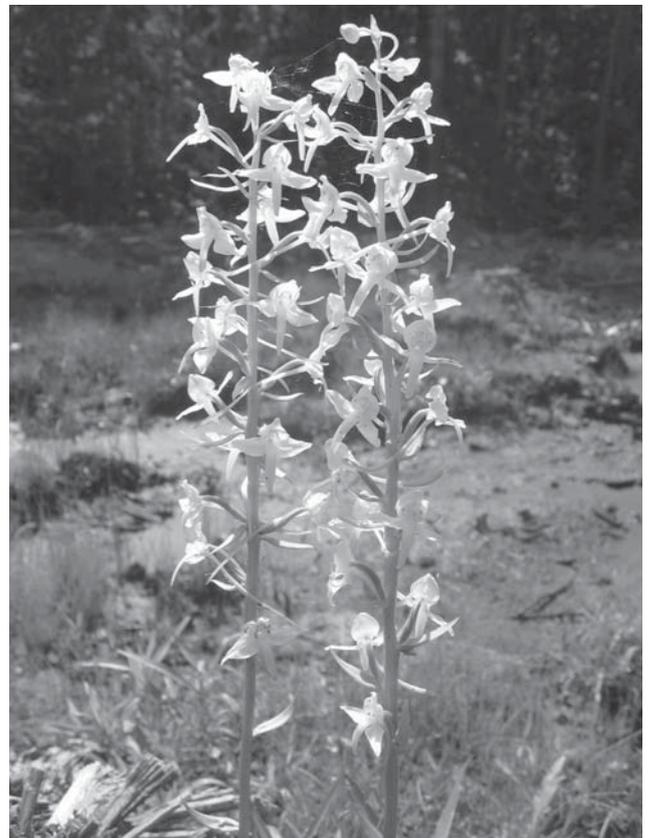


Fig. 7. *Platanthera bifolia*.



Fig. 8. *Platanthera chlorantha*.



Fig. 9. *Allium ursinum*.



Fig. 10. *Matteuccia struthiopteris*.



Fig. 11. *Polypodium vulgare*.



Fig. 13. *Polystichum braunii*.



Fig. 12. *Polystichum aculeatum*.



Fig. 14. *Equisetum hyemale*.

*atrorubens* could be found occasionally on the edges of the forest, at the outskirts of Velykyi Lis, Radychiv and Rozlety villages. *Epipactis helleborine* is represented by small populations at the outskirts of Velykyi Lis, Radychiv and Rozlety villages. *Lilium martagon* (Fig. 6) has a small number of scattered populations of 3–5, sometimes of up to 10 species in the Rykhlivska Dacha Reserve, outskirts of Radychiv, Vyshenky and Velykyi Lis villages. *Platanthera bifolia* (Fig. 7) is sporadically widespread in forest massifs

near Radychiv, Sverdlovka, Buzhanka and Velykyi Lis villages (population up to 10 species). *Platanthera chlorantha* (Fig. 8) is represented in a birch forest, sporadically in the whole territory of NNP.

The populations of the majority of orchids grow sporadically, forming separate localities or represented by individual specimens. *Allium ursinum* (Fig. 9) forms numerous populations in the central part of the park (66 Ponornytsia forest district), sporadically it is located within the natural



Fig. 15. *Gymnocarpium dryopteris*.

boundaries of “Velykyi Lis” and at outskirts of the Rykhly village. The populations (6 locations) of the epibiotic species *Matteuccia struthiopteris* (L.) Tod. (Fig. 10) form groups from 25 to more than 100 specimens and are quite valuable in the territory of NNP. The height of some specimens reaches 100–120 cm with its original cup-shaped form. Three populations of *Alnus incana* L., epibiotic species of the Ice Age, grows on bottoms of ravines at outskirts of the Pokoshychi village, “Mezyn Switzerland” and “Sverdlovskiy” landscape reserves (Andriienko and Sheliakh-Sosonko, 1983; Ustyenko, 1984; Panchenko, 2006).

There are 16 species of pteridophytes in the territory of NNP that have certain ecologic and ecotopic representation mostly and are characterized by off-type presence for regions (*Phegopteris connectilis* (Michx.) Watt, *Polypodium vulgare* L. (Fig. 11), *Polystichum aculeatum* (L.) Roth (Fig. 12), *Polystichum braunii* (Spenn.) Fee) (Fig. 13). 10 species of vascular plants recorded in the Red book of Ukraine have been found in the territory of the Mezyn NNP, among them 2 species are from research group: *Huperzia selago* and *Lycopodium annotinum*. Eight species should be distinguished among the vascular plants which are protected on a regional level in the Chernihiv Region within the research territory: *Equisetum hyemale* (Fig. 14), *Dryopteris cristata*, *Gymnocarpium dryopteris* (Fig. 15), *Matteuccia struthiopteris*, *Polypodium vulgare*, *Polystichum aculeatum*, *P. Braunii* and *Phegopteris connectilis*.

Anthropogenic influence on the forest territories of Mezyn NNP can be classified according to such groups as production and traditional economy; recreational activity; forestry activity and control measures, and also violation of the reserved regime that took place in the recent years.

Forestry activity on the Mezyn NNP is connected with carrying out of sanitary measures of selective sanitary cuttings and cuttings for clutter liquidation. Some farmlands (mainly land stock, partially decomposed lands) is at the stage of formation of *Elytrigia repens* (L.) Nevski and is not currently used. *Populus tremula*, in places *Pinus sylvestris* L., *Betula pendula*, *Acer negundo* L. and *Robinia pseudoacacia* grow on deposit territories around the forest massifs.

Recreation influences on vegetation cover of the NNP include such directions as mechanical damage of trees and bushes, picking flowers, medical raw materials, berries, mushrooms, soil packing, indirect influences through the factor of anxiety for animals in forest, fishing, hunting and others. Cenosis of the first stage of degradation are predominated in the territory of the park, because ecosystems are generally not included in the sphere of usage. Forest territories and areas around settlements are under the most intensive influence of recreation factor. Such areas are characterized by roads, growth decreasing, change of grass cover as a result of cereal invasion, growing of light-loving forest plants and some species of weeds and also using territories as grasslands for cattle, human recreation and littering.

A general tendency of changes in vegetation cover under the influence of anthropogenic factor, partially including recreational component states that the processes of structure simplification of some cenoses, weeds invasion with aggressive strategy, appearance of unstable cenoses, decreasing of productivity and stability of nature communities take place on certain territories. To solve many aspects of recreational changes, zoning of the park territory should be done in order to protect main types of vegetation communities, rare cenoses and species of plants.

## CONCLUSIONS

The Mezyn National Natural Park is characterized by the strongly dismembered landscape that stipulates presence of various localities, among them there are exterminated glaciofluvial plains, slopes and streamside terraces. Forest vegetation of the Mezyn NNP is generally characterized by great diversity and complexity and large areas with homogeneous vegetation are absent. In the Mezyn NNP a forest vegetation is represented mainly by oak with the predominant lime-oak and maple-lime-oak forest. The original forest of the Mezyn NNP belongs to the group of *Fagetalia sylvaticae* Pawlowski 1928 according to the floristic classification.

There are 772 species of spontaneous flora and 194 species of the cultivated flora in the park, 16 species of vascular plants are recorded in the Red book of Ukraine, among them 10 species belong to the forest group. The wood occupies 38% of the Mezyn NNP and provides a variety of ecotopic terms after provides a wide spectrum of representation and protection of forest species of vascular plants species and corresponding phytocommunities.

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