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Forest Typology and Settlement Characteristics of the Emerald Network “The Lower Part of the Uda River Valley” in the Kharkiv Region

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Abstract. The importance and significance of the conservation of the Emerald Object “The lower part of the Uda River Valley” (UA0000295) in botanical and general ecological aspects is discussed in detail. It is located on the outskirts of Kharkiv with an area of 13,381.0 ha. The studied area combines floodplains of regions occupied by meadows, shrub fragments and forest vegetation, and pine forests with artificial pine plantations. Areas of the loess plateau with arable land and deciduous forests, as well. List of the leading plant species, area's, main ecological and biotic features of identified habitats under Resolution 4 of the Berne Convention, in particular, C1.222, C1.32, C1.33, C3.34, D5.2, E1.2, E2.2, E3.4, F9.1, F3.247, G1.11, G1.21, G1.41, G1.8, G3.4232, G1.A4, G1.A1 for the Emerald Object are presented. The largest areas are occupied by biotops of lowland bogs with sedge and reed thickets without stagnant water (D5.2). There are plain hay fields (E2.2) and wet and moist meadows with a predominance of grasslands (E3.4) and deciduous forests in medium rich and rich soils (G1.A1), fresh and dry forests, and Sarmatian-type forests (G3.4232). The typological diversity of the forest of the territory, the area covered with forest vegetation is 11,585.0 ha, were outlined. Oak (*Quercus robur* L.) (8,091.5 ha, 69.83%) with a predominance in its plantations of fresh maple-linden oak and Scots pine (*Pinus sylvestris* L.) (2,529.8 ha, 21.84%) with a predominance of fresh oak-pine sedge are the main forest-forming species. Some species have appropriate conservation status in Ukraine (*Botrychium lunaria* (L.) SW., *Dactylorhiza incarnata* (L.) Soo s.l., *Epipactis palustris* (L.) Crantz, *Anacamptis coriophora* (L.) R.M. Bateman, Pridgeon & M.W. Chase (*Orchis coriophora* L.), *A. palustris* (Jacq.) R.M. Bateman, Pridgeon & M.W. Chase (*Orchis palustris* Jacq.), and several species are protected at the regional level (*Centaurium erythraea* Rafn., *C. pulchellum* (Sw.) Druce, *Dianthus stenocalyx* Juz., *Inula helenium* L., *Iris pseudacorus* L., *Filipendula ulmaria* (L.) Maxim., *Caltha palustris* L., *Geum rivale* L., *Parnassia palustris* L., *Sanguisorba officinalis* L., *Valeriana officinalis* L.)

Keywords: natural habitats, the Uda River valley, Emerald Network, rare plants



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INTRODUCTION

One of the important properties of the ecological network, or even its attribute, which underlies the very concept of the ecological network, should be its transit concerning various elements of economic infrastructure, including their integral complexes, settlements. It can provide a certain composition of natural and economic factors within individual natural-territorial complexes. Such a combination should be treated primarily as a precedent for finding consensus and ways to harmonize between natural and anthropogenic. Based on the principles of human society's awareness of the need to yield to nature. Only this approach will provide the prospect of forming a balance between nature and the economy. Under such conditions, it is possible to establish a regime of inexhaustible use of nature and optimization of the environment.

The Uda River Valley serves as an ecocorridor and connects several BioCenters. It is one of the territorial units of the regional ecological network of the Kharkiv region. The natural complexes of the valley are promising for the development of the Emerald Network, so the public proposed to include it in the Emerald Network. Proposals for the feasibility of creating two objects "The upper part of the Uda river valley" (UA0000292, area 10550,6 ha) and "The lower part of the Uda river valley" (UA0000295, area 13,381.0 ha) were expressed and implemented. This article is devoted to the characteristics of natural complexes of the Emerald Network object "The lower part of the Uda river valley" (UA0000295).

The Udyansk regional eco-corridor passes through four districts and the city of Kharkiv. Its length is more than 100 km. Only seven key territories were identified within it by the developers of the econetwork of the Kharkiv region. Only two of them were characterized by a sufficient area (as for regional BioCenters) – the Zolochivsky landscape reserve (1,477.7 ha) and the Rogozyanske wetland (532 ha) reserved for the will [1]. Subsequently, to optimize the Udyansk Eco-Corridor, it was proposed to add five more key areas and change its configuration. In particular, the introduction of the territory around the source of the Uda River into the eco-corridor, as well as its expansion in the areas bordering the town of Zolochiv, was considered expedient, which would cover an extensive system of ravine with remnants of natural vegetation and forest belts outside the urban area.

The target attention of ecologists and environmentalists is focused on objects that form the part of the Emerald Network [2], or promising for its introduction, more and more often now. Considerable attention is paid to the exploration and study of rare and invasive plant species in the study of these objects [3-5]. Some publications related directly to the northeastern part of the Forest-Steppe, both certain objects of the Emerald Network and natural complexes outside them [6-8]. The typological and botanical characteristics of the forests of five objects of the Emerald Network of Ukraine were

revealed: "Mozh River Valley" [9], "Dergachiv Forest" [10]. Information on the representation of endangered natural habitats in Europe in northeastern Ukraine has been summarized [7]. However, information of ecological and botanical character is insufficient, fragmentary, or completely absent in publications on most objects of the Emerald Network, which are located within the Kharkiv region. "The lower part of the Uda river valley" belongs to such objects.

The purpose of the study is to determine the environmental importance and significance of the object of the Emerald Network "The Lower part of the Uda River Valley" in botanical, forest typological and general ecological aspects.

MATERIALS AND METHODS

The materials for research were facts on forest management of Babayevsky forests, Vasyschivsky forest of SE "Zhovtneve LH" and Krasnopolyansky forest of SE "Zmiivske LH"; archival data from the Department of Botany and Plant Ecology of V.N. Kharkiv National University Karazin; Personal geobotanical descriptions of plant communities for 2015-2019, reconnaissance data conducted by route method in July 2020. Primary geodata were obtained by the means of NexGISMobile mobile application. The QGIS Desktop 2.18.4 software was used for their internal processing.

An electronic resource was used to characterize terrain and altitude indicators [11] Google Maps and forest management data were used to measure the area of individual tracts and habitats. To analyze the types of forest vegetation conditions and forest types, a database of forest assessment indicators was formed of wood plots according to the data from forest evaluation descriptions of forest management materials. The analysis has been performed using MS Excel 2016. The collection of the herbarium and its processing was carried out according to standard methods. The names of the taxa were given according to "Vascular Plants of Ukraine. A Nomenclatural Checklist" [12]. Descriptions of vegetation areas with the participation of rare species were performed according to the generally accepted method. Sample plots were established within the natural limits of phytocenoses. Areas with an area of 30x30 m were selected for forest groups, for meadow-steppe, meadow and swamp – 5x5 m. In determining the types of habitat, the literary sources of the last years of publication were used [13; 14]. The analysis of the typological structure of forests was carried out according to the methods of the Ukrainian school of forest typology [15; 16].

RESULTS AND DISCUSSION

Among the six middle rivers of the Kharkiv region (Oskil, Udy, Lopan, Merla, Oril, Samara) it is the Uda valley of the river Uda that is a transit for the city of Kharkiv. The height of the water surface of the Uda riverbed is 94 m

above sea level in the city, at the confluence of the Lopan river. The height of individual surfaces of the root bank is up to 202 m above sea level. The Uda riverbed flows for more than 70 kilometers, traveling along a fairly wide valley until it flows into the Siverskyi Donets River at a water surface height of 87 m above sea level. This high enough indicator of the local basis of erosion contributes to the deep dismemberment of the adjoining regions and

the formation of powerful modern sediments of loose rocks in the adjacent areas. According to the physical-geographical zoning scheme, this territory (Fig. 1) belongs to the physical-geographical district of Zolochiv-Chuhuiv of the Kharkiv slope-upland region of the eastern Ukrainian land of the forest-steppe zone of the eastern European plain [17].

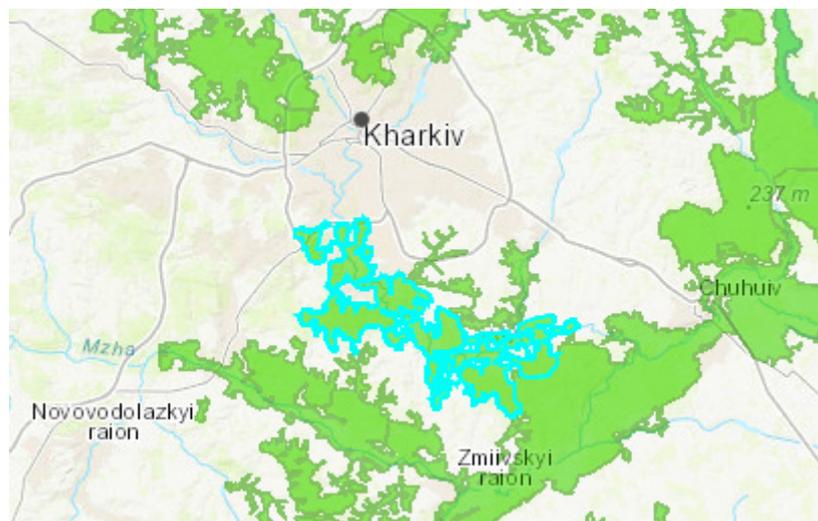


Figure 1. The scheme of the territory of the Emerald network object “The lower part of the Uda River Valley”

Source: [18]

In geomorphological terms, the territory of this Emerald object covers the floodplain surrounded by scattered segments of the pine terrace and the loess plateau. A well-defined floodplain stretches from the central parts of the city of Kharkiv to the confluence with the Siverskyi Donets River, having a diameter of 300 m, as within Kharkiv, up to 3 km, as in the area of Borova-Petrishcheve village and occupies a total area of about 3 thousand ha. The altitude of its surface varies from 95 to 100 m above sea level in the Babai village and from 87 to 92 m above sea level near the Eshar village. Below the Zhykhor residential district, various local depressions are widespread on floodplain extensions, such as weakly swampy lowlands and scattered low-flowing old lakes. One of the largest lakes is located north of the Gusyna Polyana village. It covers an area of up to 4 ha. Borovo-terrace plots are composed of ancient alluvial sand deposits reshaped from the surface by aeolian processes with surface heights in the range of 110-155 m above sea level adjacent mainly to the left bank. Significant areas are occupied by pine forests, the largest of which are located in particular to the south of the urban village Bezlyudivka and to the south-west of the urban village Vasyshchevo. As a result of sand mining on the site of old quarries, one of the largest artificial reservoirs has been formed in the city of Kharkiv, Nahorivske Lake. Together with the technical reservoirs (Kovalenky Lake), it covers an area of more than 100 ha. This Emerald Object should also include plots of the loess plateau. It is occupied by natural and

semi-natural vegetation, in particular, deciduous forests of zonal type. These plots are mostly confined to the right bank by forested areas, in particular, south of the line of human settlements Borova – Krasna Polyana – Zaudie – Stara Pokrovka, Khoroshevo – Zhykhor – Gusyna Polyana.

The main types of plots within this area: floodplain areas with fresh and moist soils in modern alluvial-diluvial deposits. They are occupied by meadows, fragments of shrubs, forest vegetation, sometimes agrophytocenoses and fallows that have formed in their place. The pine terrace areas are made up of ancient alluvial sand from the surface complicated by aeolian sediments. They are dominated by artificial pine plantations; plots of the loess plateau with arable land and deciduous forests.

The total area of forested areas is 11,585 hectares. *Quercus robur* L. and *Pinus sylvestris* L. are the main forest-forming species. The first species occurs in an area of 8,091.5 ha, and the second 2,529.8 ha. Other species occupy small areas: *Populus tremula* L. (197.7 ha), *Acer platanoides* L. (186.7 ha), *Fraxinus excelsior* L. (129.6 ha), *Tilia cordata* Mill. (102 ha), *Betula pendula* Roth. (99.0 ha), *Acer campestre* L. (35.9 ha), *Alnus glutinosa* (L.) Gaerth. (35.8 ha), *Ulmus carpinifolia* Rupp. ex G.Suckow (30.8 ha), *Salix alba* L. (9.9 ha), *Populus alba* L. (6.9 ha), *P. nigra* L. (2.9 ha), *Malus sylvestris* Mill. (0.7 ha). An introductory species are the forest-forming species on the territory of 125.6 ha. This is approximately 1% of the total forest area. The largest

area is occupied by *Robinia pseudoacacia* L. (79.8 ha), less common are *Quercus rubra* L., *Populus deltoides* Marsh., *Fraxinus lanceolata* Borkh. (respectively, 22.4 ha, 13.4 ha and 8.2 ha). *Acer saccharinum* L. (1.5 ha), *Picea abies* (L.) H. Karst. (0.3 ha), *Juglans nigra* L. (0.2 ha) occupies a very small area.

Analysis of forest vegetation conditions revealed the following facts: the areas covered with forest vegetation are represented by 14 edatopes, covering all trophic groups and all levels of moisture, except for very dry areas (Table 1). At the same time, the largest area on the object territory of the studied object (96.4%) is occupied

by forest areas, which are characterized by fresh moisture conditions. There are much fewer areas with dry conditions (2.2%), and only about 1.5% of the total area is accounted for by areas with damp, moist, and wet humidification conditions. At the same time, fresh and dry hygrotopes predominate under the conditions of the hruds, and under the conditions of the suhruds, subors – fresh and damp hygrotopes. In general, hruds account for three-quarters of the total area of forest. Subors account for almost one-fifth, and the least common are forests and suhruds, each with an area of just over 2%.

Table 1. Distribution of forest vegetation areas covered by edatopes

Hihrotopy	Trophotopes				At
	A	B	C	D	
1	0.2	–	5.8	249.6	255.6
2	305.5	2,201.9	176.7	8,485.3	11,169.4
3	–	22.7	51.9	52.4	127.0
4	–	2.8	14.1	15.2	32.1
5	-	-	-	0.9	0.9
Total	305.7	2,227.4	248.5	8,803.4	11,585.0

For dry humidification conditions, typical forest types are eroded maple sudibrova and dry pine forest (5.8 and 0.2 ha, respectively). Wetlands are more diverse – black alder moist suhruds and hruds, wet hruds, as well as moist floodplain poplar-willow hruds (the part of the first three is 0.12%, 0.08% and 0.01% of the total area, the last – 0.05%). In humid floodplain wetting conditions, there are also areas of sedge subors and sudibrovy, each of which accounts for only 0.02% of the area. The fresh floodplain subsoil occupies 10.8 ha, which is 0.09%. The area of sudibrovs in fresh conditions of flooding of floodplain habitats is twice less than 4.6 ha. In damp humidification conditions on the

area 23.4 ha maple-linden sudibrova is also presented. Linden-oak-pine suhrud is widespread in both fresh and damp hygrotopes (the area of the first 161.3 ha, the second only 26.6 ha).

In total, 21 forest types are represented on the forest vegetation-covered territory (Table 2). Maple-linden oak occupies three-quarters of the territory, with 8,485.3 ha of fresh maple-linden oak wood, dry – 249.6 ha, and damp oak wood occupies only 19.8 ha. A small area is also characteristic of damp linden-ash oak wood (32.6 ha) as well. At the same time, damp and moist oak-pine subir in the ratio of 9:1 are common only by 0.2%. The area of fresh pine woods is 305,5 ha.

Table 2. Distribution of the area of forested regions by forest types

Nº n / a	Names of forest types	Area, ha
1	Dry pine wood	0.2
2	Fresh pine wood	305.5
3	Fresh oak pine subir	2,201.9
4	Damp oak-pine subir	20.3
5	Damp floodplain sedge subir	2.4
6	Moist oak-pine subir	2.8
7	Dry eroded maple sudibrova	5.8
8	Fresh sudibrova	4.6
9	Fresh linden-oak-pine suhrud	161.3

Table 2, Continued

Nº n / a	Names of forest types	Area, ha
10	Fresh floodplain sudibrova	10.8
11	Damp maple-lime sudibrova	23.4
12	Damp linden-oak-pine suhrud	26.6
13	Damp floodplain sudibrova	1.9
14	Moist black alder suhrud	14.1
15	Dry maple-lime oak wood	249.6
16	Fresh maple-lime oak wood	8,485.3
17	Damp maple-lime oak wood	19.8
18	Damp linden-ash oak wood	32.6
19	Moist black alder hrud	9.8
20	Moist floodplain poplar-willow hrud	5.4
21	Wet black alder hrud	0.9
Total		11,585.0

As mentioned above, within the study area, the main forest-forming species are *Quercus robur* and *Pinus sylvestris*. Analysis of the confinement of these species to certain types of edaphotopes revealed the following. *Quercus robur* stands for trophic conditions of habitats that occur mainly in oak wood (on an area of 8,040.9 ha), rarely in sudibrova (on 49.5 ha) and in fragments in forests (in 1.1 ha), and on humidity – mainly in fresh conditions (on an area of 7,812.3 ha), rarely in dry (230 ha) and damp (49.2 ha). *Pinus sylvestris* stands for trophic habitat conditions occurring mainly in subir (on an area of 2,155.1 ha), much less in pine wood (304.6 ha), quite rarely in suhruds (60.6 ha) and hruds (9.5 ha), and in terms of humidity, mainly in fresh conditions (on the area of 2,520.9 ha) and very rarely in damp (5.6 ha), moist (2.0 ha) and dry (1.3 ha). *Quercus robur* grows in 9 forest types, but the largest area of its stands is occupied by fresh maple-linden oak wood (7,786.6 ha) and much smaller in dry maple-linden oak wood (230,0 ha). *Pinus sylvestris* also grows in 9 forest types, but the largest area (2,147.5 ha)

of its stands is occupied by fresh oak-pine subors, much smaller is occupied by fresh pine wood (304.4 ha) and fresh linden-oak-pine suhrud (56.0 ha). In other types of forests, the growing stock of these two species occupies small areas.

Currently, for the territory of the Kharkiv region, described 77 types of the level settlements of I-III level according to the EUNIS classification, which needs protection as components of the ecological network, nature reserve fund and the Emerald Network, and must be protected following Resolution No. 4 of the Bern Convention and the European Union Settlement Directive [7]. The study showed that within the object of the Emerald Network “The lower part of the Uda river valley” there are 14 types of settlements included in the list of objects (Table 3), the preservation of which in Europe requires the creation of special protection areas [13]. They are included in the list of objects for the preservation of which in Europe it is necessary to create areas of special protection [13].

Table 3. Settlements from Resolution 4 of the Bern Convention of the Emerald Network object “The lower part of Uda River Valley” (tabular data are filled in according to the methodology)

Resolution 4 Habitat type			Site assessment			
Code	Cover [ha]	Data quality	A / B / C / D		A / B / C	
			Representativity	Relative Surface	Conservation	Global
C1.222	0.3	M	D	–	–	–
C1.32	5	M	D	–	–	–
C1.33	3	M	D	–	–	–
C3.34	0.5	M	D	–	–	–
D5.2	300	G	B	C	B	C
E2.2	500	G	B	C	C	C
E3.4	100	M	C	C	C	C

Table 3, Continued

Resolution 4 Habitat type			Site assessment			
Code	Cover [ha]	Data quality	A / B / C / D		A / B / C	
			Representativity	Relative Surface	Conservation	Global
F9.1	1	P	D			
G1.11	300	M	C	C	C	C
G1.41	25	M	C	C	C	C
G1.8	180	M	C	C	C	C
G3.4232	2500	M	C	C	C	C
G1.A4	250	M	C	C	C	C
G1.A1	8500	G	B	C	C	C

Source: [19]

Settlements C1.222 – Free-floating monodominant clusters of *Hydrocharis morsus-ranae* occasionally occur in small fragments along shores and areas pond with slow-flowing waters. Variants of monodominant groups predominate, less often with insignificant participation in the cover of pleistophytes.

C1.32 – Free-floating vegetation of eutrophic reservoirs occurs everywhere in small areas throughout the Uda River. The shallow waters of the old floodplain lakes are characterized by much larger (up to several acres) areas of this vegetation, especially in the second half of the growing season. Most often, the main dominants of these groups are *Lemna minor* L. and *Spirodela polyrrhiza* (L.) Schleid. Sometimes colonies of filamentous algae play a significant role in such groups. Also common group with co-dominance of *Lemna trisulca* L.

The most typical variant of groups indicating habitats C1.33 (rooted submerged vegetation of eutrophic reservoirs), represented by thickets of *Ceratophyllum demersum* L. There are separate groups with a predominance of certain species of pondweed (*Potamogeton lucens* L., *P. perfoliatus* L., *P. gramineus* L.). Most often, the distribution of these settlements is characteristic of areas of the channel with slow flow and the waters of old lakes.

Eutrophic vegetation of slow-flowing waters (settlements C3.34) is most often represented by small fragments of groups dominated by *Nuphar lutea* (L.) Smith. and its distribution is similar to the previous ones. Aquatic habitats (category C) within this object of the Emerald Network occupy small total areas (Table 3).

Biotope (D5.2) – Lowland swamps with sedge and reed thickets without stagnant water often occur in the form of strips-borders adjacent to the riverbed in the floodplain depressions. During spring and summer floods, these areas are sometimes flooded. They are dehydrated most of the growing season. In some places, they are used for hay. A significant part of such settlements are groups dominated by *Phragmites australis* (Cav.) Trin. ex Steud. Groups dominated by *Carex acutiformis* Ehrh., *C. acuta* L. are also common. Populations of some rare species for the region and the European *Ostericum palustre* (Bess.) Bess., *Inula helenium* L.

We found one of such habitats of *Ostericum palustre* in similar biotopes west of the village of Nahorivka in the meadows of the floodplain of the Uda River (49,864116 north latitude; 36,266887 east longitude).

Biotope E2.2 – Plain pastures are represented by floodplain pastures and pastures in large areas (Table 3). Large arrays of these meadows are distributed along the entire floodplain of the Uda River. The main dominants are cereals and sedges, such as *Arrhenatherum elatius* (L.) J. et al. Presl, *Alopecurus pratensis* L., *Bromopsis erecta* (Huds.) Fourr., *Dactylis glomerata* L. For areas with loose soils where until recently plowing was carried out, a characteristic predominance of long-rhizome grasses, such as *Elytrigia repens* (L.) Nevski, *Carex hirta* L., *C. praecox* Schreb., *Equisetum arvense* L., *Cirsium arvense* (L.) Scop. In plots with a high content of mobile nitrogen in the dominant role, there are representatives of forbs such as *Anthriscus sylvestris* (L.) Hoffm., *Pastinaca sativa* L. As co-dominants, most often grow, *Galium boreale* L., *Geranium collinum* Steph. In areas of mane elevations *Galium mollugo* L., *Scirpus sylvaticus* L., *Calystegia sepium* (L.) R. Br., *Lysimachia nummularia* L. *Linaria vulgaris* Mill., *Ambrosia artemisifolia* L., *Festuca valesiaca* Gaud., *Eryngium campestre* L. are more common.

Wet and damp meadows on rich silty soils with a predominance of forbs (biotopes E3.4) have been located along floodplain depressions, which are characterized by organogenic accumulation processes. They are characterized by groups of tall grasses from the wetland, dominated by species such as *Eupatorium cannabinum* L., *Sonchus palustris* L., *Urtica pubescens* Ledeb., *Bidens frondosa* L., *Leersia orizoides* (L.) Sw., *Angelica sylvestris* L., *Filipendula ulmaria* (L.) Maxim. The peculiarity of these habitats is the relatively high potential for the formation of phytomass, which dies mainly annually, and the poor availability or inaccessibility of its selection for economic needs. This is associated with a significant consortium-forming role of these habitats and the high species richness of phytophages in general and insects in particular. Together with the biotopes mentioned above, there is a complex of riparian shrub-forest biotopes (F9.1+G1.11). In elevated areas, groups with the

participation of *Prunus spinosa* L. often grow. Usually, the bushes tier is rather cover and is formed by thickets of thorny thorns with insignificant participation of *Fraxinus excelsior*. The grasses are almost absent due to the high shading of the shrub tier, but the most trivial species of meadow grasses grow in rarefaction. The most common variant of mesohydrophilic shrub vegetation in depressions is the group dominated by *Salix pentandra* L. with an admixture of *Salix cinerea* L. Fragments, sometimes significant in the area (up to ten acres) occur in willow-poplar forests of the riparian floodplain.

G1.41 – swampy alder forests on non-acidic peat are distributed here only in fragments. Alder nettles are their most typical variants. They grow in drying areas of terraced floodplain depressions. And alder sedge is confined to excessively and long-moist areas.

G1.8 – acidophilic oak forests are common in fresh and moist podzolic soils on the slopes of the pine terrace. Occur in fragments.

G1.A1 – deciduous forests in medium-rich and rich soils are widespread on the loess plateau and occupy large areas here (Table 3). A typical dominant in the upper tier is *Quercus robur*, and co-dominated by *Acer platanoides*, *A. campestre*, *Tilia cordata*, *Fraxinus excelsior*, sometimes *Ulmus laevis* Pall., *Pyrus communis* L. In the undergrowth tier, in addition to the undergrowth of the above-mentioned trees, shrubs grow, such as *Crataegus pseudokyrstostyla* Klok., *Euonymus verrucosa* Scop., *E. europaea* L., *Corylus avellana* L. The tier of grasses is sometimes weakly formed. *Aegopodium podagraria* L. and *Carex pilosa* Scop. are most often dominant in large areas. *Chelidonium majus* L., *Poa nemoralis* L., *Carex michelii* Host, *C. digitata* L., *Asarum europaeum* L., *Lathyrus vernus* (L.) Bernh., *Stellaria holostea* L., *Pulmonaria obscura* Dumort., *Polygonatum multiflorum* (L.) All., *Glechoma hirsuta* Waldst. & Kit., *Geum urbanum* L., *Mercurialis perennis* L., *Dactylis glomerata* L., *Lapsana communis* L., *Brachypodium sylvaticum* (Huds.) Beauv., *Fragaria vesca* L., *Viola hirta* L., *Lysimachia nummularia* L., *Lactuca chaixii* Vill. Grow everywhere as co-dominants and asectators. Among the ephemeroids identified by underground organs, *Corydalis solida* (L.) Clairv., *Ficaria verna* Huds.

G1.A4 – ravine and slope forests of natural and semi-artificial origin are represented by different coenotic variants of stages of demutation of forest vegetation. In particular, illuminated thermophilic forests with the dominance of *Ulmus carpinifolia* and significant participation in stands of such species as *Fraxinus excelsior* and *Pyrus communis* grow in the apical sections of the slopes. Separately, in the second tier, there are *Prunus spinosa* L., *Acer tataricum* L. In the grasses, the dominant *Poa angustifolia* L. is widespread. As codominants, *Hypericum perforatum* L., *Melampyrum nemorosum* L., *M. cristatum* L., *Centaurea substituta* Czer., *Betonica officinalis* L. *Potentilla obscura* Willd., *Poa compressa* L., *Rumex crispus* L., *Falcaria vulgaris* Bernh., *Trifolium montanum* L., *T. medium* L., *Eryngium planum* L., *Tanacetum vulgare* L.

Hieracium cymosum L., *Vicia villosa* Roth, *Medicago falcata* L. aggr., *Daucus carota* L., *Elytrigia repens* (L.) Nevski, *Achillea millefolium* L. grow separately and with a covering of less than 1%.

G3.4232 – fresh and dry pines and subor of the Sarmatian type are confined to the highest areas of pine terraces. *Pinus sylvestris*, sometimes with significant participation of *Quercus robur*, is the main forest-forming species in sandy, slightly podzolic soils. In the second tier, you usually grow *Populus tremula*, *Quercus robur*, *Betula pendula*, *Sorbus aucuparia* L., *Acer negundo* L. In the poorly formed tier of undergrowth, all of the above species occur. Certain areas are also characterized by *Crataegus pseudokyrstostyla*, *Euonymus verrucosa*, *E. europaea*, and *Chamaecytisus ruthenicum* (Fisch. Ex Wol.) Klaskova, *Sambucus racemosa* L. The tier of grasses is usually poorly formed. The dominants include *Calamagrostis epigeios* (L.) Roth, *Poa nemoralis*, *P. angustifolia*, *Carex praecox* Schreb. Typical asectators in the grass level are *Pilosella echioides* (Lumn.) F.Schultz & Sch. Bip., *Hieracium umbellatum* L., *H. virosum* Pall., *Carex ericetorum* Poll., *Silene nutans*, *Polygonatum odoratum*, *Mycelis muralis* (L.) Dumort., *Senecio vulgaris* L., *Helichrysum arenarium* (L.) Moench. *Chamerion angustifolium* (L.) Pigeon. forms thickets in cluttered places and fires. Pure pine stands are often characterized by the development of moss synusias with a predominance of *Dicranum rugosum* and *Pleurocium shreberi*.

It should be noted that the object of the Emerald Network “Lower part of the Valley of the River Uda” has not only a certain synzoological value but also considerable phytosoological significance. In general, some species of plants are protecting at the national (*Botrychium lunaria* (L.) SW., *Dactylorhiza incarnata* (L.) Soo s.l., *Epipactis palustris* (L.) Crantz, *Anacamptis coriophora* (L.) R.M. Bateman, Pridgeon & M.W. Chase (*Orchis coriophora* L.), *A. palustris* (Jacq.) R.M. Bateman, Pridgeon & M.W. Chase (*Orchis palustris* Jacq.) and regionally (*Centaurium erythraea* Rafn., *C. pulchellum* (Sw.) Druce, *Dianthus stenocalyx* Juz., *Inula helenium* L., *Iris pseudacorus* L., *Filipendula ulmaria* (L.) Maxim., *Caltha palustris* L., *Geum rivale* L., *Parnassia palustris* L., *Sanguisorba officinalis* L., *Valeriana officinalis* L.) were found in the natural complexes of the Uda River Valley (in the middle course) [7; 9]. Special attention was paid to the study of local populations within the territory of Kharkiv of those species that are listed in the Red Data Book of Ukraine and have the status of vulnerable, in particular, conducted a phyto-indication assessment of growth conditions, established their compliance with ecological amplitudes of rare species. In the upper reaches of the Uda River in floodplain meadows on the left bank of Rogozyansky Reservoir, in addition to *Anacamptis palustris* and *Dactylorhiza incarnata*, the species *Dactylorhiza maculata* (L.) Soó sl. and *D. majalis* (Rchb.) P.F. Hunt et Summerhayes s.l. were detected. Data on the growth of certain orchid species in floodplain meadows in the lower reaches of the Uda River were presented. The identified species are listed in the Ukrainian Red Data

Book, in particular *Anacamptis palustris* and *Dactylorhiza incarnata* (near the urban village of Vasyshevo) [20]. Together with the coenopopulations located on the floodplain of the upper Uda River [21], they form a single regional population.

CONCLUSIONS

The landscape complex of the lower part of the Uda River Valley has an important ecosystem potential that will contribute to the preservation of the natural complex of the studied region. This area includes tracts where populations of protected plant species are growing. Settlements from Resolution 4 of the Bern Convention are also presented in large areas of research. Within of the Emerald Network object "The Lower part of the Uda River Valley" 14 types of protected settlements are presented. Large areas are represented by biotopes with a predominance of grass (D5.2; E2.2; E3.4) and forest

(G1.11; G1.8; G3.4232; G1.A1; G1.A4) vegetation. An important structural and territorial feature of this natural protection object is that it is an important connecting element of the ecological network of this urbanized region. The total area of forested areas is above 11,585 hectares. The main forest-forming species are *Quercus robur* and *Pinus sylvestris*. The areas covered with forest vegetation are represented by 14 edatopes, covering all trophic groups and all moisture levels, except for very dry ones. The largest area on the territory of the studied object (96.4%) is occupied by fresh humidification conditions, much fewer areas with dry conditions (2.2%) and approximately 1.5% of the total area is accounted for by areas with damp, moist, and wet humidification conditions. While the huds relate to three-quarters of the total forest area, the forests account for almost one-fifth. The least common are pine wood and suhruds, the area of each of which is slightly more than 2%.

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Лісотипологічна та оселищна характеристика об'єкту Смарагдової мережі «Нижня частина долини річки Уди» в Харківській області

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Анотація. Висвітлено природоохоронну важливість і значимість Смарагдового об'єкту «Нижня частина долини річки Уда» (UA0000295) площею 13381,0 га в околицях м. Харкова в ботанічному та загально-екологічному аспектах. Досліджена територія поєднує ділянки заплавної знижень зайнятих луками, фрагментами чагарникової та лісової рослинності, масивами борової тераси із штучними сосновими насадженнями, а також ділянками лесового плато із орними землями та широколистяними лісами. Для Смарагдового об'єкту наведено перелік провідних видів рослин, площі та основні еколого-біотичні особливості виявлених оселищ з Резолюції 4 Бернської конвенції, зокрема C1.222, C1.32, C1.33, C3.34, D5.2, E1.2, E2.2, E3.4, F9.1, F3.247, G1.11, G1.21, G1.41, G1.8, G3.4232, G1.A4, G1.A1. Найбільші площі з них займають біотоми низинних боліт із заростями осок і очерету без застою води (D5.2), рівнинних сінокісних (E2.2) і мокрих та вологих лук із переважанням різнотрав'я (E3.4) та широколистяних лісів на середньо-багатих та багатих ґрунтах (G1.A1), а також свіжі і сухі бори та субори сарматського типу (G3.4232). Висвітлено лісотипологічне різноманіття території, причому площа вкритих лісовою рослинністю ділянок становить 11585,0 га. Основними лісотвірними породами є дуб звичайний (*Quercus robur* L.) (8091,5 га, 69,83 %) з переважанням у його насадженнях свіжої кленово-липової діброви та сосни звичайної (*Pinus sylvestris* L.) (2529,8 га, 21,84 %) з переважанням свіжого дубово-соснового субору. Ряд видів мають відповідний статус збереження в Україні (*Botrychium lunaria* (L.) SW., *Dactylorhiza incarnata* (L.) Soo s.l., *Epipactis palustris* (L.) Crantz, *Anacamptis coriophora* (L.) R.M. Bateman, Pridgeon & M.W. Chase (*Orchis coriophora* L.), *A. palustris* (Jacq.) R.M. Bateman, Pridgeon & M.W. Chase (*Orchis palustris* Jacq.), а ряд видів охороняються на регіональному рівні (*Centaureum erythraea* Rafn., *C. pulchellum* (Sw.) Druce, *Dianthus stenocalyx* Juz., *Inula helenium* L., *Iris pseudacorus* L., *Filipendula ulmaria* (L.) Maxim., *Caltha palustris* L., *Geum rivale* L., *Parnassia palustris* L., *Sanguisorba officinalis* L., *Valeriana officinalis* L.)

Ключові слова: природне місцезростання, долина річки Уди, Смарагдова мережа, рідкісні рослини