IV. ПРИРОДНИЧО-ГЕОГРАФІЧНІ ДОСЛІДЖЕННЯ

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RESTORATION OF DEGRADED URBAN WETLANDS (BY THE CASE OF SOVSKI PONDS IN KYIV)

The article is devoted to the problem of preservation of urban wetlands as the most vulnerable valuable ecosystems in the conditions of rapid urbanization, which need to be protected.It researches the current state of the Sovky tract (and the lower cascade wetlands of the Sovski Ponds located within it) in the center of Kyiv.Despite the strong urban influence, rich floristic and faunal diversity of the studied area has been revealed.

The value of urban wetlands for Kyiv is determined by the vital ecosystem services provided to the local community.Such services include, first of all, regulation of the microclimate, moisture and nutrients distribution in the soil, habitats preservation for the rare species of animals and plants, regulation of the groundwater levels, pollution filtration, waste adsorption, oxygen production and carbon dioxide absorption, water quality improvement, mitigation of the climate change consequences, creation of the favourable conditions for recreation, etc.

As a result of field surveys of the Sovky tract, the complete decline of the territory and the degradation of valuable wetlands have been indicated.We have investigated the main geoecological conflicts caused by littering of the territory with household and construction waste, persistent pollution of the water bodies caused by untreated sewage due to unauthorized intrusions of residents into the household sewers, chemical and noise pollution from the road infrastructure, grass burning in spring, etc. The spatial localisation of all conflicts within the Sovky tract is shown on the relevant map.The negative consequences of the long-term unresolved conflicts for the functioning of the wetlands and the quality of the ecosystem services they provide have been identified.

Given the perspective of development in the study area of the ecopark and a fairly general idea of the essence of this concept, we proposed to include wetlands of Sovky tract in the Nature Reserve Fund of Kyiv.According to the current legislation, this area meets all the criteria of the category "Regional Landscape Park" (RLP).The main purpose of preserving the unique urban wetlands is the protection of rare species of plants and animals and their natural habitats, which is possible only in the conditions provided for in the RLP reserved zone. In addition, granting the official status of a protected area will make it impossible to build and litter within unique urban wetlands in the future.

Keywords: urban wetlands, geoecological conflicts, Sovski Ponds, urban impact, protected area.

Relevance of the research. According to Ramsar Convention on Wetlands *(The Ramsar Convention Manual, 1971),* urban and suburban wetlands are located inside and around urban areas and suburbs. The importance of wetlands for vital activities of cities and towns shall be determined by the numerous ecosystem services that are rendered to the urban community. Wetlands are habitats for many plant and animal species, producers of biomass and oxygen, natural reservoirs and water purification filters. Wetlands accumulate moisture, transfer surface runoff to the subsurface runoff, reduce the height of the flood wave and increase the minimum runoff of rivers in dry periods, prevent the activation of erosion processes. Wetland vegetation and soils, while retaining organic and toxic substances, contribute to the reduction of eutrophication of reservoirs *(Vodno-bolotni uhiddia Ukrainy, 2006; Alikhani, Nummi, & Ojala, 2021)*. Simultaneously, the quality of wetlands ecosystem services is decreased every year due to rapid urban growth. According to UN, 55 % of the world's population live in cities nowadays. According to estimates, 68 % of the world's population will live in cities by 2050 *(United Nations, 2018).* The powerful impact of urbanization on urban wetlands leads to their fragmentation, loss of relations, reduced species and ecosystem biodiversity. The significance of urban wetlands preservation is emphasized by the slogan of Ramsar Convention on the occasion of the World Wetlands Day 2018 "Wetlands for Sustainable Urban Development." The urgency of the research problem has been increased significantly since the commencement of active hostilities within the territory of Ukraine, as a result of which, about 30% of Ukrainian conservation areas, including 14 Ramsar sites with the area of 397.7 thousand hectares, are in danger as of the end of April 2022 *(Mindovkillia, 2022).*

Analysis of recent research and publications. A lot of foreign scientific works are devoted to the problem of wetland conservation in cities. The vast majority of them emphasize the vulnerability of valuable ecosystems in the conditions of rapid urbanization and of necessity for preservation and protection. Urban areas usually have less vegetation and water compared to the surrounding areas; blue-green infrastructure is often degraded due to increased population density *(Gunawardena, Wells, &Kershaw,2017).* Urban wetlands ensure various ecosystem services and are their vital providers for people. These services include water quality improvement *(Quin, Jaramillo, &Destouni, 2015),* air pollution reduction, carbon sequestration, as well as recreation and leisure *(Das, &Basu, 2020).* Interaction with valuable ecosystems in cities improves physical and mental health of urban dwellers, as urban wetlands offer a wide range of social and cultural services,

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such as creation of a space for recreation and leisure for urban dwellers*(Alikhani, Nummi, & Ojala, 2021)*.

According to the results of the meta-analysis of evaluative studies conducted by Chinese scientists, wetlands are the most vulnerable ecosystems on the globe *(Zhou, Wu, &Gong,2020)*. While wetlands play an important role in cities by way of offering a variety of ecosystem services, these services shall be subject to powerful anthropogenic pressure due to rapid urban growth. The results of many studies indicate a growing negative relationship between urban development, the state of wetlands and their ecosystem services, which indicates the necessity for adoption of the policy of blue-green infrastructure management in accordance with the paradigm of Ramsar Convention regarding "smart use" of wetlands *(Kometa, Kimengsi, &Petiangma,2017)*. Urban wetlands consist of various elements such as coastal vegetation, soil and water. The blue-green infrastructure of the cities combines hydrological network and green areas with the built environment *(Ye,Hao, &Cao,2018)*. Urban wetlands not only ensure ecosystem and recreational services in cities, but also improve water quality due to natural purification and climate regulation. Wetlands create their own unique microclimate and reduce overheating of urban environment. The wetland can act as an urban adaption measure against the urban heat island effect by potentially transforming them into an urban cooling island (UCI) towards a favorable urban bioclimate*(Shahjahan,Ahmed, &Said,2020)*.

The scientific works devoted to the study of urban wetlands are insufficient in Ukraine. Wetland ecosystem services has been researched by Ye. Mishenin, N. Dehtiar at al. In the scientific work *(Dehtiar, 2013),*the problems of creation of an organizational and economic mechanism for the management of wetlands ecosystem services are disclosed, and the methodological approaches to their assessment by way of building an integral evaluation of ecosystem services are developed. The survey of the natural biotic potential of the cascade of lakes of Sovska Lowland performed by V. Prydatko-Dolin (2008a), according to the results of which the disappearance of the species entered into a Red Book, the reduction of the species diversity and fragmentation of habitats of the species in case of development of the territory of the lower cascade ponds are provided, shall be worth noticing. In the scientific work *(Prydatko-Dolin, 2008b),* using GIS analysis, the significance of creation of an object of nature reserve fund within the territory of Sovski Ponds, but not a shopping and entertainment complex, was substantiated, and the list of substantive proposals for further development of this territory was provided. Ornithological studies of certain areas of grassland and wetland landscapes of Kyiv city, including Sovski Ponds, were conducted by M. Prychepa. He revealed significant differences in the species composition of birds depending on the degree of anthropogenic load on wetlands and substantiated their value for biodiversity protection *(Prychepa, 2019)*.

The purpose and tasks of the study. The purpose of the study is to investigate the current state of theSovky tract, to identify geological and ecological conflicts within its boundary, and to propose the methods of preservation of wetlands in the center of Kyiv city. In order to achieve the purpose, the following tasks have been set and resolved: 1) to analyze foreign and domestic sources of information devoted to the study of the problems of urban wetlands management; 2) to investigate the value of Sovski Ponds and the surrounding area from the point of view of biodiversity and of the presence of rare species of flora and fauna; 3) to identify the primary factors of negative urban impact on wetlands and their consequences for ecosystem services; 4) to substantiate the causes of geological and ecological conflicts and their spatial localization within the studied territory; 5) to propose to include theSovky tract in the Nature Reserve Fund of Kyiv, and to establish a Regional Landscape Park within its territory as the only way to preserve the unique urban wetlands.

Method and methodology. The object of the study is the wetlands of theSovky tract in the center of Kyiv city, where valuable natural landscapes are uncontrollably destroyed, recreational areas are reduced, comfort level of the urban environment is significantly decreased. This study is based on the application of general principles of organization of blue-green urban infrastructure and geoinformation method of mapping, analysis of numerous scientific works, high-resolution satellite images. Despite the decision of Kyiv City Council on inclusion of all water bodies of the city in the Unified Open Register, the Sovka River with the ponds have not been certificated yet, and they are not on the balance sheet of the Municipal Enterprise "Pleso", which significantly complicated the initial data analysis. In order to identify the causes and exact locations of geological and ecological conflicts and their mapping, the field surveys of the terrain within theSovky tract have been performed. Based on their results, using QGIS 3.22.6 software, the relevant map chart has been made using the topographic plans of Holosiivskyi and Solomianskyi districts of Kyiv city with a scale of 1:2000, the satellite images of the terrain and OpenStreetMap cartographic materials. The algorithm of the study consists of a number of sequential actions aimed at achievement of the purpose (Fig. 1).

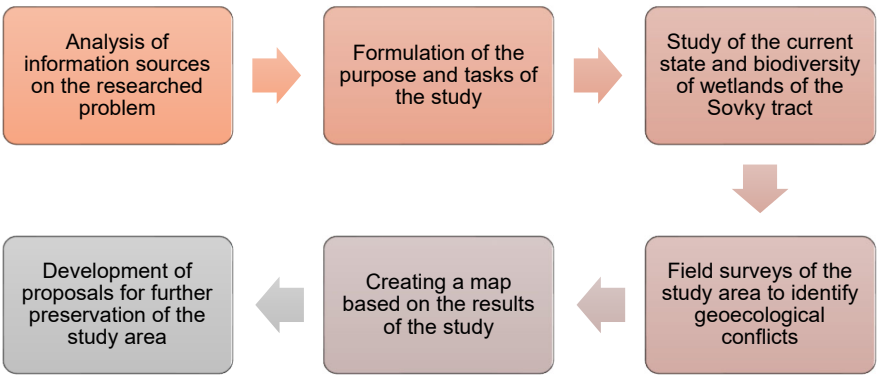

Fig. 1. Research algorithm of wetlands of theSovky tract

Presentation of the main results of the study. Sovski Ponds are located in two cascades on the Sovka River within the territories of Holosiivskyi and Solomianskyi administrative districts of Kyiv (Fig. 2). The upper cascade includes six ponds with an area of 3.8 hectares in Pronivshchyna natural boundary, in the upper reach of the Sovka River, which is the largest right tributary of the Lybid River. The lower cascade includes eleven ponds in theSovky tract, which is bordered by Volodymyra Brozhka Street in the north, by Valeriia Lobanovskoho Avenue in the south, by Demiivska Industrial Zone in the east. The main bed of the Sovka River, when the river overflows collector on the day surface, is stagnant and overgrown in some places. The cascade of interconnected ponds within theSovky tract is located on the left bank, where the width of the river bed is 2–4 m, the maximum depth is 0.3-0.4 m. As of the beginning of May 2022, the area of the water surface of the lower cascade ponds was only 2.1 hectares. Tree vegetation covers an area of 9.9 hectares; willow, oak, aspen, sorbus, sycamore dominate.

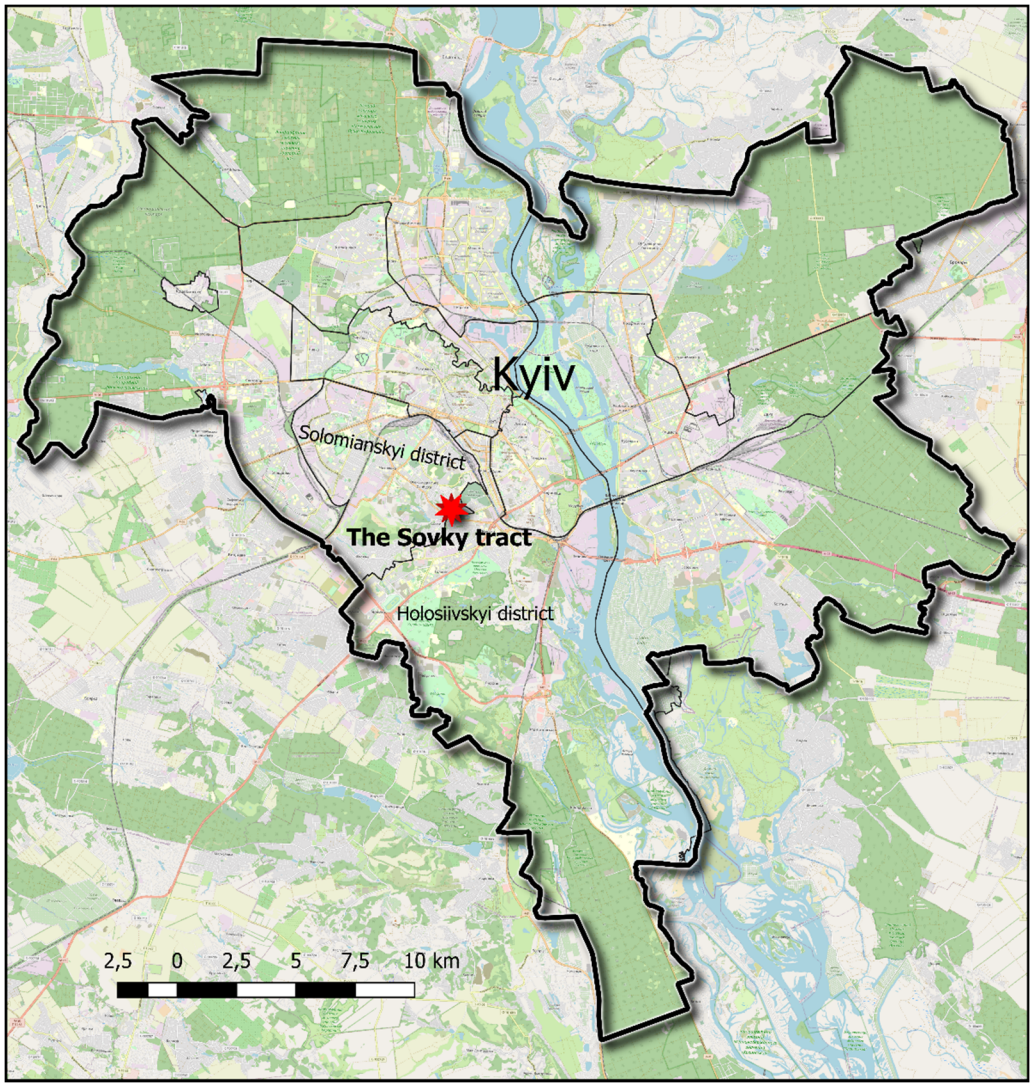

Fig. 2. Location of the Sovky tract within Kyiv

Within the Sovky tract, the water and coastal vegetation, typical for wetlands, is dominant and represented bythe rigidhornwort (*Ceratophyllum demersum* L.), the sago pondweed (*Stuckenia pectinata*), the whorl-leaf watermilfoil (*Myriophyllum verticillatum*), the lesser duckweed (*Lemna minor* L.) andthe ivy-leaved duckweed (*Lemna trisulca* L.), the common duckmeat (*Spirodela polyrrhiza*). The acute sedge (*Carex acuta*), the great manna grass (*Glyceria maxima*), the water horsetail (*Equisetum fluviatile*), the lakeshorebulrush (*Schoenoplectus lacustris*), the broadleaf cattail (*Typha latifolia*) andthe narrowleaf cattail (*Typha angustifolia*), the sea clubrush (*Bolboschoenus maritimus*), the water avens(*Geum rivale*), the marsh-marigold(*Caltha palustris*), the soft rush (*Juncus effusus*), the creeping buttercup (*Ranunculus repens*), the purple loosestrife (*Lythrum salicaria* L.), the yellow loosestrife (*Lysimachia vulgaris* L.) grow on the marshland meadows surrounding Sovski ponds. The valerian (*Valeriana*officinalis L.), the gray willow (*Salix cinerea*), the almond-leaved willow (*Salix triandra* L.) and the white willow (*Salix alba)* is found in some places.

Wetland ecosystems of the Sovky tract are the habitats of rare insect species entered in the Red Book of Ukraine (RBU). The emperor dragonfly(*Anax imperator* Leach, 1815), the golden-ringed dragonfly (*Cordulegaster boltonii*), the Jersey tiger (*Euplagia quadripunctaria* Poda, 1761), the blue underwing (*Catocala fraxini* Linnaeus, 1758), the musk beetle (*Aromia moschata* Linnaeus, 1758) live here *(Prydatko-Dolin, 2008a).* The existence of the latter two

species depends entirely on the preservation of white willows. Also, the following types of amphibians entered in the RBU live within the Sovky tract: the European tree frog (*Hyla arborea* Linnaeus, 1758) and the European fire-bellied toad (*Bombina bombina* Linnaeus, 1761). There are species protected under the Berne Convention, including the common spadefoot (*Pelobates fuscus* Laurenti, 1768), the common toad (*Bufo bufo* Linnaeus, 1758) and the European pond turtle (*Emys orbicularis* Linnaeus, 1758). The water birds protected under the Berne Convention build nests within the boundary of Sovski Ponds: the common coot (*Fulica atra* Linnaeus, 1758), the waterhen (*Gallinula chloropus* Linnaeus, 1758), the common kingfisher (*Alcedo atthis* Linnaeus, 1758) *(Prychepa, 2019).*

Due to biodiversity of insects, the ponds serve as a feeding area for bats protected under the Berne Convention: the common noctule (*Nyctalus noctula* Schreber, 1774) and the serotine bat (*Eptesicus serotinus* Schreber, 1774). Despite the powerful urban impact, the wetland area remains suitable for bird feeding and nesting. The mallard (*Anas platyrhynchos*), the common coot (*Fulica atra*), the common moorhen (*Gallinula chloropus*), the great reed warbler (*Acrocephalus arundinaceus*) are found on the ponds and in the coastal thickets. The bluethroat (*Luscinia svecica*), the common rosefinch (*Carpodacus erythrinus*) and even owlish, in particular the little owl (*Athene noctua*), are found on wet meadows *(Polianska et al., 2017; Prychepa, 2019).*

The ponds on the Sovka River created by the monks of Kyievo-Pecherska Lavra were reflected first by military engineer, Danilo de Bosquet, on the plan of Kyiv city and its environs in 1753. Since 1923, the ponds entered the borders of Kyiv. In the first half of the 1930 s, people began to breed fish in them and prepare ice for industrial refrigeration of food products. At that time, local fish stocks met the needs of the entire local community*(Polianska et al., 2017).* Pollution of wetlands began in 1930 with the construction of the plant "Chervonyi Humovyk" in close proximity to the territory of the Sovky tract. Nowadays, the reservoirs are in decline, fishes have not been introduced for a long time, and the reservoirs are not even cleaned. Therefore, the ponds of the lower cascade have silted up, have become overgrown with bulrush and have a minimum water level. Due to a state of neglect and lack of landscaping, the surrounding area is hardly used for recreational purposes. The ponds of the upper cascade are in a better state. The influence of urban surroundings on the Sovka River with ponds located in the center of the city has led to significant degradation of urban wetlands.

Sovski ponds are surrounded by several residential areas where thousands of people live. Due to illegal inserts of the residents of Shyrma microdistrict private sector to the city sewerage, the contaminated wastewater flows directly into the first pond, which turns it into a drainage ditch. Despite the presence of wetland vegetation that filters the water, the unpleasant smell remains, especially in the warm season. The emergency sewage collector is between the ponds, it is periodically clogged, and the sewage disposals overflow into the ponds. This creates the unpleasant smells that are well perceived in close proximity to the ponds. In addition, the tightness of the sewage system is damaged by the roots of the trees that germinated through the joints of the pipe.

Considering the fact that the ponds of the lower cascade with the surrounding meadows remain a small island of unspoiled wildlife in the center of the city for a long period of time, bitter disputes between developers and local residents related to this territory take place. In 2008, Limited Liability Company "Hospodarnyk" received more than 19 hectares of a 15-year leased land of the lower cascade of Sovski Ponds for arrangement of a recreational zone and for construction of an entertainment and shopping complex. This became possible due to changes in the Program for Development of Green Zone in the city of Kyiv by 2010 *(Pro zatverdzhennia Prohramy rozvytku zelenoi zony m. Kyieva, 2005).* Prior to the introduction of these changes, establishment of two parks – "Sovska Balka" with an area of 35.9 hectares and "Balka Pronia" with an area of 16.2 hectares within the territory of both cascades of Sovski Ponds was planned. The entertainment center has not been built for ten years, but instead of it the developer decided to erect an entire residential quarter with offices and high-rise buildings within the Sovky tract in 2018. Therewith, only two large and two small ponds out of the eleven cascade ponds were envisaged. According to experts, construction of 20-storey buildings would lead to destruction of the entire green space and reservoirs, destruction of flora and fauna, increase in the volume of poisonous emissions into the air, microclimate changes, loss of the recreational zone *(Sovski stavky, 2021).* The settlement of at least a few thousand people would cause transport collapse, additional strain on social infrastructure, severe noise pollution and a sharp decline in living comfort.

At the same time, Schmalhausen Institute of Zoology conducted an inspection of the ponds of the lower cascade, which confirmed the impossibility of development in this territory due to threats to the existence of rare species of plants and animals. A year later, due to the demands of local residents, the agreement for the lease of Sovski Ponds was appealed in the economic court. The court proceedings lasted for two years, and on June 15, 2021, the Northern Economic Court of Appeal confirmed the decision of the court of first instance and returned the lower cascade of Sovski Ponds to the community of the capital. Following that, the ecological commission of Kyiv City Council approved the establishment of an eco-park within the boundary of Sovski Ponds *(Ekolohichna komisiia pidtrymala stvorennia parku, 2021*). However, in order to build a park in close proximity to Sovski Ponds, the Municipal Association "Kyivzelenbud" must obtain the right to use this land plot on a permanent basis. The utility companies will be allowed to commence design and improvement of the territory only following approval by the land commission of Kyiv City Council of the land allotment. Therefore, the digression of wetland ecosystems is in progress in Kyiv.

In order to identify the real causes of decline of valuable wetlands, the geological and ecological conflicts and their spatial distribution within the lower cascade of Sovski Ponds have been studied (Fig. 3). Despite the fact that burning of stubble, meadows, pastures, areas with steppe vegetation, wetland vegetation and other natural vegetation is prohibited in Ukraine *(Kodeks Ukrainy pro administratyvni pravoporushennia, 2022, art. 77-1*), the cases of unauthorized burning of grass within the Sovky tract are quite common. Burning of grass stand causes the death of rare species of plants and insects in the soil, plant litter and grass, the destruction of seeds on the surface and in the upper layers of the soil. Disruption of natural vegetation cover promotes the penetration of alien species into the local flora, which destroys the integrity of the original grass stand and deteriorates the forage base of pollinating insects.The products of combustion of snag stand increase air pollution, the quality of which is already low due to the impact of highways and construction works in the areas adjacent to

the ponds.The burning of coastal biocenosis surrounding Sovski Ponds leads to the disruption of wetlands ecosystem services that are vital for the local community, including in particular the limit ability to break down wastes, to filter soil moisture, to produce oxygen, and to absorb carbon dioxide, to maintain biotic and genetic diversity, etc. (Table 1). The littering of the territory of the natural boundary with solid household and construction waste has become significant. Motor vehicles and construction works add severe noise pollution in the areas adjacent to the ponds. All this together causes the synergistic effect of urban impact on the unique wetlands of Kyiv.

Since the final decision on establishment of an eco-park within the territory of Sovski Ponds has not been taken yet, it should be noted that the concept of "eco-park" is very generalized. For example, the official website defines Global Green Eco-Park as "a fully inclusive integrated biosphere program for any object that provides stability at all levels" *(Eco Parks, 2022)*. In Ukraine, the project of O. Feldman for family recreation with entertainments and a zoo in the suburbs of Kharkiv city, and a small square in the center of Kiev city with solar panels, art object and a cover made of recyclable wastes are also considered as an eco-park. If something similar is implemented within the territory of the lower cascade of Sovski Ponds, it will not have any conservation status. The primary purpose of preservation of urban wetlands is the protection of rare species of plants and animals, as well as their natural habitats and the entire ecosystem, not just landscaping and recreational development. In view of this, we consider it appropriate to include this small island of wild nature located in the center of the city in the Nature Reserve Fund (NRF) of Kyiv.

Fig. 3. Geoecological conflicts within the Sovky tract

Five years ago, environmentalists made a proposal to create a landscape reserve of local significance within the territory of the lower cascade of Sovski Ponds *(Polianska et al., 2017),* but this proposal was not considered by Kyiv Authorities. At that time, the studied area was leased by the developer. Currently, there is every reason for establishment of a Regional Landscape Park (RLP) with the conditional name "Sovky." The choice of this category of NRF completely meets the requirements of current legislation, according to which the purpose of establishment of RLP is to preserve the natural state of typical or unique natural complexes, and to provide conditions for organized recreation. The tasks entrusted to RLP have also been clearly defined: preservation of valuable natural complexes and objects, creation of conditions for efficient recreation in natural conditions with observance of the nature protection regime *(Pro pryrodno-zapovidnyi fond Ukrainy, 2021, art. 23).* As to the improvement of the territory, the immediate purification of water bodies, including Sovski Ponds, is provided for by the draft Master Plan of Kyiv city by 2040 *(Proiektom Henplanu Kyiev a peredbacheno, 2020).* Granting the official status of a conservation area will make the development, pollution and littering of the city's unique wetlands impossible in the future.

The primary criterion of compliance of Sovky natural boundary with the requirements for the category of NRF of Ukraine "Regional Landscape Park" shall be rich diversity of flora and fauna and presence of typical and rare plant communities within its territory. If an eco-park is established, you will not avoid the risk of transformation of Sovski Ponds with the surrounding area into a city park of culture and rest where the recreational flows are not controlled in any way. Under such conditions, the preservation of unique wetlands will be extremely difficult. Of course, the status of NRF territory shall not provide the unquestionable guarantees that visitors will comply with all environmental requirements, especially in the specific conditions of the urban environment. For example, these requirements are not met in RLP "Partyzanska Slava" in Darnytskyi district of Kyiv, which was included in the NRF of Ukraine in 1994. During the entire period of its operation, this Park has not become

a full-fledged environmental institution. The numerous attempts of illegal development, uncontrolled entry of vehicles and mass felling of perennial plantings throughout its territory are recorded here. Administrative buildings, trade tents and attractions, food establishments, etc. are located on the illegally seized land plots of the Park. Due to the lack of valuable natural complexes and objects, the reserved zone of RLP "Partyzanska Slava" is only 0.21% of its total area *(Havrylenko, & Tsyhanok, 2019),* which gives visitors the reason not to perceive the Park as an institution of NRF.

***Table* 1. Consequences of geoecological conflicts of the Sovky tract**

Urban impact	Consequences of the impact	Disturbed ecosystem services of wetlands
Clogging of the sewer between the ponds, violation of the tightness of the sewer pipe	Transfusion of sewage into ponds, pollution of water bodies, the emergence of unpleasant odors, difficulty accessing oxygen	Regulation of the microclimate, distribution of moisture and nutrients in the soil, provision of fresh water, dissolution of effluents, preservation of habitats of animals and plants rare species, regulation of groundwater levels
Car wash on the coast of Sovski ponds	Pollution of reservoirs and air above them, underground aquifers, violation of the whole grassland, soil compaction	Water purification, filtration of pollution, cultural and aesthetic, accumulation of greenhouse gases, prevention the penetration of invasive species, regulation of local watercourses, microclimatic control
Operation of gas stations close to the tract	Groundwater pollution in case of emergency fuel spills, air pollution due to evaporation of petroleum products and car exhaust	Fresh water supply, microclimate regulation, water purification, groundwater level regulation, soil quality maintenance, soil filtration, air quality regulation, waste adsorption
Littering with household and construction waste	Congestion of the territory, destruction of plants within meadow biotopes and certain areas of coastal biocenosis, air pollution	Soil moisture filtration, waste decomposition, genetic material, pollination, floristic biodiversity, microclimatic control, soil formation, oxygen production and carbon dioxide absorption
Developed road network around the tract	Pollution of surface water bodies and groundwater aquifers, littering of coastal habitats	Erosion control, absorption of carbon dioxide and air pollutants, maintenance of soil quality, regulation of surface and soil moisture reserves, filtration of water into the soil, evaporation and retention of precipitation
Spring burning grass	Fragmentation of wetlands, air pollution, destruction of rare plants and their habitats, depletion of the forage base of important pollinating insects	Nitrogen uptake, soil formation, soil moisture replenishment, nutrient and water cycles, biodiversity maintenance, trophic chain conservation, adverse climatic mitigation, pollination
Dense residential buildings in the areas adjacent to the tract	Reduction of populations of rare species, synanthropization of flora and fauna, simplification of the structure of biocenosis, destruction of established ecosystem links	Ecological-educational, cultural-aesthetic, scientific-cognitive, regulation of air quality, reduction of noise pollution, preservation of habitats of rare plants and animals, mitigation of consequences of natural meteorological phenomena
Unauthorized cutting into the household sewer and sewage disposal into the Lybid River and ponds	Contamination of water bodies with untreated effluents, the appearance of unpleasant odors, the influx of organic matter and the intensification of eutrophication	Water purification, waste adsorption, retention of moisture and nutrients in the soil, maintenance of genetic and species biodiversity, preservation of waterfowl habitats
Creation of fortifications (trenches and shafts) on the side of V. Lobanovskoho Avenue	Violation of the integrity of the soil cover and the original grass, the destruction of natural habitats of plant and animal species	Maintenance of soil formation processes and nutrient cycles, absorption and accumulation of carbon and other greenhouse gases, regulation of microclimate and groundwater level, protection against erosion

In view of this, the feasibility of the establishment of a regional landscape park instead of the planned eco-park requires more detailed substantiation and discussion. The main advantage of a regional landscape park over other categories of NRF, in particular landscape reserve, is the ability to divide the RLP into functional zones, and thus to reliably conserve the most vulnerable areas with the most valuable biodiversity by way of their inclusion in the conservation area. Any conservation area within the territory of a city cannot function properly without solving all the issues caused by the impact of the urban environment, in particular compliance with the regime of functional zones, streamlining the recreational pressure, protection from illegal development, etc. (*Koynova* &*Zavadovich*, 2005). Uncontrolled recreational activity will lead to the inevitable degradation of the most significant wetland ecosystem services. Therefore, the residents of the residential areas adjacent to Sovski Ponds shall have the opportunity to choose one of two options: either mass recreation and entertainments, or conservation in the natural state of the habitats of rare species subject to certain restrictions and prohibitions from participating in recreational activities. Therewith, it is very important to avoid the mistakes and miscalculations made in the process of design of such urban protected areas, including in the city of Kyiv. Keeping the coastal margins of the ponds free from household, construction and other litter; stopping the discharge of domestic sewage into the Sovka River and into the ponds; maximum possible restoration of natural vegetation; cleaning of banks, reach and bottoms of ponds; regulation of the water regime within the territory; enhanced protection of rare species of flora and fauna and their habitats should be among the priority measures that are necessary for preservation of Sovski Ponds and the abandoned surrounding area.

Conclusions and prospects of the research. In view of the rapid intensification of urbanization processes around the world, the issues of preservation of small islands of unchanged natural landscapes are relevant in every city. The development of Kyiv city is accompanied by the destruction of green areas, pollution of water bodies and air, reduction of recreational areas and deterioration of public health. In different parts of the capital, the disputes regularly erupt between the developers and the local residents that

defend their right to a favorable environment for living and recreation. One of such "small islands" of wild nature in the center of Kyiv city is Sovky natural boundary, where unique wetlands have been degraded for a long time. Meanwhile, the ecosystems of the natural boundary are the habitats of rare species of insects and amphibians entered in the Red Book of Ukraine. The amphibians protected under the Annex II to the Convention on the Conservation of European Wildlife and Natural Habitats (Berne Convention) and the Red Book of the International Union for Conservation of Nature are also found. Despite the powerful urban effect, Sovski Ponds is a nesting place for several species of water and other birds protected under the Berne Convention. The territory of the wetlands is the feeding base for some species of the bats entered in the RBU, Appendix II of the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention). Thus, rich species diversity and genetic diversity are found within the territories of the ponds and of the coastal thickets.

Sovky reservoirs and the surrounding area decline is due to many factors, including the discharge of untreated sewage, persistent chemical and noise pollution on the part of road infrastructure and construction, pollution form household and construction waste, lack of any improvement and cleaning. According to the results of the field survey of Sovky natural boundary, the spatial localization of the primary geological and ecological conflicts within the studied area has been identified and reflected on the map chart. It is established that the state of wetland complexes is the most negatively affected by unauthorized inserts to domestic sewage and wastewater discharge to the Lybid river and to the ponds, emergency state of the sewage collector between the ponds, pollution of the territory from household and construction waste, heavy traffic on the road network surrounding the natural boundary, dense residential construction in the microdistricts adjacent to the natural boundary, illegal burning of grass, etc. Due to the threat of invasion of Kyiv city by the enemy troops, in March 2022, the sandbagged trenches were dug within the natural boundary on the side of V. Lobanovskoho Avenue. This has become an additional factor of negative impact on natural ecosystems.

Despite the powerful recreational potential, the clutter of the Sovky tract and the offensive odor make impossible any appropriate recreation and leisure within its territories. This is despite the fact that thousands of people residing in the nearby residential areas have no other places for recreation, except for Holosiivskyi Park, which still needs to be reached by public transport. Urban wetlands provide vital ecosystem services to the community, in particular improvement of water quality, mitigation of climate changes, conservation of wildlife, creation of opportunities for recreation, etc. In view of vulnerability to urban impact, urban wetlands require special treatment and protection in order to secure the valuable services they provide. The most effective way to solve this problem is to create a regional landscape park within the studied area, one of the tasks of which shall be promotion of effective recreation of the population in natural conditions. In order to substantiate the necessity for preservation of urban wetlands and for creation of protected areas within their territories, the ecosystem services that are the most significant for the local community and disrupted as a result of urbanization impact on the natural complexes have been identified. The results of the study shall be the basis for planning the measures for minimization of geological and ecological conflicts and for mitigation of urban pressure on the ecosystems of the Sovky tract.

The novelty of the study is to identify the causes of long-term degradation and potential threats to the natural area surrounded by housing estates, highways and construction sites. The map chart of the spatial localization of the existing geological and ecological conflicts has been made for the first time for the studied area of Sovky natural boundary. The practical significance of the study results is that they may be taken as a basis for landscape and functional zoning of the territory in future, if the decision on establishment of a new Regional Landscape Park in Kiev city is taken. That is, the developed map chart with the reflected primary threats and factors of degradation of ecosystem services shall be the basis for such zoning and further management of the protected area.

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ВІДНОВЛЕННЯ ДЕГРАДОВАНИХ МІСЬКИХ ВОДНО-БОЛОТНИХ УГІДЬ (НА ПРИКЛАДІ СОВСЬКИХ СТАВКІВ У КИЄВІ)

Статтю присвячено проблемі збереження міських водно-болотних угідь як найуразливіших цінних екосистем в умовах стрімкої урбанізації, які необхідно зберігати й охороняти. Досліджено сучасний стан урочища Совки у середмісті Києва, у межах якого розташовано водно-болотні угіддя (ВБУ) нижнього каскаду Совських ставків. Попри потужний урбаністичний вплив, виявлено багате видове флористичне й фауністичне різноманіття досліджуваної території. Цінність міських ВБУ для Києва визначається життєво необхідними екосистемними послугами, які надаються місцевій громаді. До таких послуг належать, насамперед, регулювання мікроклімату, розподіл вологи й поживних речовин у ґрунті, збереження оселищ рідкісних видів тварин і рослин, регулювання рівня ґрунтових вод, фільтрація забруднень, адсорбція відходів, продукування кисню й поглинання вуглекислоти, поліпшення якості води, пом'якшення наслідків зміни клімату, створення сприятливих умов для відпочинку населення тощо.

У результаті проведення натурних обстежень урочища Совки зазначено повний занепад території та деградацію цінних ВБУ. Досліджено головні геоекологічні конфлікти, зумовлені засміченням території побутовими й будівельними відходами, стійким забрудненням водойм неочищеними стоками через несанкціоновані врізання жителів у побутову каналізацію, хімічним і шумовим забрудненням з боку дорожньої інфраструктури, весняним випалюванням травостою тощо. Просторову локалізацію всіх конфліктів у межах урочища Совки відображено на відповідній картосхемі. Показано негативні наслідки тривалого нерозв'язання зазначених конфліктів для функціонування ВБУ та якості екосистемних послуг, які вони надають.

З огляду на перспективу розбудови на досліджуваній території екопарку й загальні уявлення щодо сутності цього поняття, нами запропоновано включити ВБУ урочища Совки до складу природно-заповідного фонду Києва. Згідно з діючим законодавством ця територія відповідає всім критеріям категорії "регіональний ландшафтний парк" (РЛП). Головною метою збереження унікальних міських ВБУ є охорона рідкісних видів рослин і тварин та їхніх природних оселищ, що можливо лише в умовах передбаченої в РЛП заповідної зони. Крім того, надання офіційного статусу природоохоронної території унеможливить забудову й засмічення унікальних міських ВБУ в майбутньому.

Ключові слова: міські водно-болотні угіддя, геоекологічні конфлікти, Совські ставки, урбаністичний вплив, природоохоронна територія.