

## КОНСТРУКТИВНА ГЕОГРАФІЯ І ГЕОЕКОЛОГІЯ

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## RUSSIAN-UKRAINIAN WAR: ENVIRONMENTAL ASPECT

*According to the results of the study of the nature protection aspect of the russian-Ukrainian war, it was established that since 2014, the russian federation illegally captured and destroyed about 500 objects of the nature reserve fund of Ukraine, with a total area of over 1.2 million hectares. Came under occupation 3 Biosphere Reserves, 14 Nature Reserves, 19 National Natural Parks, dozens Regional Landscape Parks, hundreds Reserves, Sights Nature, Reserve Tracts, Botanical gardens, Dendrological parks, Zoological parks and Parks-sights of garden and park art. Famous protected objects suffered from russian military aggression: Biosphere Reserve «Askania-Nova», Chornomorskyi Biosphere Reserve, National Natural Parks «Slobozhanskyi», «Gomilshan Lisy», «Svyati Hory», «Meotida», «Oleshkivs'ki Pisky», Nature Reserve «Khomutovsky Step». Practically all types of biodiversity in the protected areas have been destroyed, unique landscapes are disturbed, the scientific achievements of specialists of nature-reserved objects were liquidated or exported. Cases of mining of protected areas have been recorded, uncontrolled deforestation, destruction of rare species of flora and fauna, etc.*

*At the first stage of military aggression, in 2014, russia illegally occupied 100% of the natural reserve fund of the Crimean peninsula, 25.2% of the nature reserve fund of Donetsk region and 23.8% of the nature reserve fund of Luhansk region. In the second stage of aggression and full-scale war against Ukraine, from February 24, 2022, the russian federation completely seized all territories and objects of the nature reserve fund of Donetsk and Luhansk regions, as well as a significant part of valuable nature conservation of Kyiv, Sumy, Chernihiv, Kharkiv, Zaporizhzhia, and Kherson regions. As of September 1, 2022, a large part of the territory of Ukraine, including nature conservation areas, is freed from occupation. But it is still quite difficult to assess the damage caused to the national nature reserve fund. Therefore, the prospect of further scientific-practical research remains the assessment of damage caused to protected objects and territories in the east and south of Ukraine.*

**Key words:** war, russian aggression, national natural parks, nature reserves, biosphere reserves, flora, fauna.

**Introduction.** The consequences of the large-scale invasion of the Russian army in Ukraine are difficult to assess and calculate under constant bombardment and shelling. However, according to official information from state structures [10] and international humanitarian organizations [17], in just one month of the war, Ukraine lost more than 5,000 civilians, about 3,000 military personnel, 6.5 million people became internally displaced persons and more than 3, 5 million - went abroad. The damage caused to the infrastructure of Ukraine, according to various estimates, amounts to more than 120 billion dollars [10] for more than 7 months of the war. Despite the social and economic losses, Ukraine suffered significant detriment in the field of environmental protection. The environmental risks of military operations are always high. However, in this aggression against Ukraine, Russian troops are destroying not only military and civilian objects but also objects of the nature reserve fund and the national ecological infrastructure in general.

Ukrainians and russians are different, not only in origin and history of development but also in mentality, and choice of values, in particular concerning Nature and its assets. Our differences were especially evident during the period of independent Ukraine. Let's look at such a sphere of human activity as nature use and preservation of

nature. During the Soviet era, Ukraine's protected matter development took place much more slowly than the mass media announced. There were 2 biosphere reserves, 12 nature reserves, 3 national nature parks, and no regional landscape park functioned in Ukraine until 1990. During the 1990s, 2 biosphere reserves, 5 nature reserves, 8 national nature parks, and 27 regional landscape parks were created. At the beginning of the third millennium, the protected business developed at a suitable pace. Today, the areas of 5 biosphere reserves have been expanded in Ukraine, 19 nature reserves, 53 national nature parks, and more than 85 regional landscape parks [15] are functioning, which made it possible to double the number of protected areas in the territory of Ukraine in 30 years of independence.

**Literature review.** Russian aggression against Ukraine since 2014 has caused significant damage to the national environmental infrastructure. Since the first days of the war, Ukraine has been constantly monitoring the state of the environment in the area of the anti-terrorist operation (ATO) and the operation of the joint forces [4]. In its quarterly reports, the Ministry of Environmental Protection and Natural Resources of Ukraine regularly highlights information about the radiation background, and the level of atmospheric air and surface water pollution in the

combat zone and adjacent territories. There is also statistical information on damage to the Nature Reserve Fund's temporarily occupied objects and territories.

The international charity organization «Environment People Law» [3] systematically researches, analyzes and highlights information about the territories and objects of the Nature Reserve Fund, which have suffered or are suffering from the military aggression of the Russian Federation. Experts of this organization have published more than 20 materials in collections of scientific papers and abstracts of conferences devoted to the study of the fate of protected areas during the war years. Among the main publications, we can highlight the research of O. Kravchenko. Vasylyuk, A. Voytsekhovskiy, and K. Norenko [7]. N. Lisova [8], associate professor of the Department of Geoecology of the Ternopil National Pedagogical University, systematized information about the consequences of the Russian invasion of Ukraine in 2014.

Publications are devoted to separate issues of legal responsibility for the environmental consequences of the Russian war against Ukraine Medvedeva M. [9], Avdoshin I., Velichko M., Kiriljuk O. [1], Baljuk G., and Shompol O. [2]. Problems of the impact of military conflicts on the environment are highlighted in the publications of foreign scientists: Wyatt J. [18], Tara W. [16].

**The main material.** The impact of the Ukrainian-Russian war on the territories and objects of the Nature Reserve Fund of Ukraine should be divided into two stages: The first stage is the period of the illegal annexation of Crimea and the eastern parts of the Luhansk and Donetsk regions. The II stage is a full-scale invasion of Russia on the territory of Ukraine from February 24, 2022.

In the first stage, beginning in February 2014, Russia annexed Crimea and part of Donbas.

Accordingly, the Nature Reserve Fund objects were damaged in these territories. Unfortunately, to this day it is not known what state the natural complexes of the Crimean Peninsula are in, and it is also difficult to assess the state of protected objects in the temporarily occupied territories of Donetsk and Luhansk regions.

On the territory of the illegally annexed Crimea, more than 200 Nature Reserve Fund objects remain under the control of the occupiers (table 1). Of which 7 nature reserves (Kazantipskiy, «Karadzkiy», «Kryms'kiy», «Lebedyni ostrov», «Mys Martyan», «Opukskiy», «Yaltyns'ko hirs'ko-lisovyi») with a total area of 74,533 hectares. One national natural park «Charivna Gavan» with an area of 10,900 hectares in the Yevpatoriya district. 14 regional landscape parks with a total area of 41,346 hectares, the most famous of which are «Bakhchisarayskiy» (10,300 hectares), «Kalinivskiy» (12,000 hectares), «Tykha Bukhta» (1,508.5 hectares), and «Bokalska Kosa» (1,520 hectares). 10 protected tracts with a total area of 2,224.5 hectares; 18 national nature reserves with an area of 99,647.5 hectares; 26 reserves of local importance with an area of 24,808 hectares; 14 natural monuments of national importance with an area of 740 hectares; 88 natural monuments of local importance with an area of 3,000 hectares. The «Nikitskiy» Botanical Garden of national importance with an area of 876.6 hectares and the Botanical Garden of local importance at the Tavria National University named after Vernadsky with an area of 32.5 hectares. Yevapotorii Arboretum of Local Importance with an area of 3.2 hectares, Zoological Park of Local Importance «Kazka» (2.5 hectares) in Yalta District, Livadia Territorial Community. As well as 9 parks-monuments of horticultural art of national importance with an area of 276.2 hectares and 21 parks-monuments of horticultural art of local importance with an area of 317 hectares [13].

Table 1

*Nature reserve fund temporarily occupied Crimean peninsula [13]*

Protected category	Object name of nature reserve fund	Area, ha
Nature Reserves	«Kazantipskiy»	1514.1
	«Karadzkiy»	2874.2
	«Kryms'kiy»	44 175.5
	«Lebedyni ostrov»	9612.0
	«Mys Martyan»	240.0
	«Opukskiy»	1594.3
	«Yaltyns'ko hirs'ko-lisovyi»	14 523.0
National Natural Parks	«Charivna Gavan»	10 900.0
Regional Landscape Parks		41 346,0
Reserve Tracts		2224.5
Reserves of national significance		99 647.5
Reserves of local significance		24 808.0
Sights Nature of national importance		740,0
Sights Nature of local significance		3000.0

Botanical gardens	Nikits'kyi Botanical gardens of national significance	876.6
	Botanical gardens of local significance at the Volodymyr Vernadsky Taurian National University	32.5
Dendrological park	«Yevpatoriys'kyi»	3.2
Zoological park	«Kazka»	2.4
Parks-sights of garden and park art of national significance		276.2
Parks-sights of garden and park art of local significance		317.0
<b>The total area is</b>		<b>258 707</b>

According to the International Charity Organization «Ecology-Law-Human», at the time of the occupation of part of the territory of Donetsk region in 2014, 117 territories and objects of the nature reserve fund with a total area of about 92,000 hectares were functioning in the region. 40 of them were completely or partially in the occupied territory (23,000 hectares), which is 25.2%. Of these, 12 territories (96.4% of all areas of the PZF that fell under occupation) were affected by military operations [3].

There are also losses in the nature reserve territories of the regions of the region controlled by Ukraine. In particular, all the largest areas of the territory of the nature reserve fund of the controlled part of Donbas were, if not on the demarcation line, then in the liberated territories, and all were damaged during the hostilities. In total, 17 such objects are known (with an area of 39,000 hectares). Fighting took place on the territory of the branches of the Ukrainian steppe Nature Reserve «Khomutovsky Step» and «Kalmiuske», in the national nature parks «Svyati Hory» and «Meotyda» [3].

A special place is occupied by the national nature park «Meotyda», the territory of which is torn in half by the front line. Today, «Meotyda» is the only institution of the nature reserve fund that left the occupied territory. Park workers left occupied Novoazovsk. The new park office was established in Urzuf in 2015. Unfortunately, the national park suffers not only from military operations. The most valuable part of the park, with Europe's largest colonies of rare aquatic birds, was damaged by «military exercises» in the self-proclaimed «DNR». As a result, bird colonies left the territory of the national park. The occupiers turned this part of the national park into a center of illegal fishing. The occupation of the central administration of the the Ukrainian steppe Nature Reserve («Khomutovsky Step» department), which housed the reserve's archives, herbariums, documentation, and library since 1926, is also an extraordinary loss. Thanks to these materials, the reserve remained a unique territory of Ukraine, where environmental monitoring was carried out continuously for almost 100 years [3].

As a result of constant shelling and hostilities, fires in natural ecosystems constantly

occur in the area of ATO and Joint Forces Operation. Thus, according to the Ministry of Environmental Protection and Natural Resources [4], fires in the Donetsk region have affected: the «Provalny Steppe» nature reserve, the «Donetsk Kryaz» Regional Landscape Park, the «Svyati Hory» National Nature Park, and the Aloskin Bugor nature reserve, «Balka Ploska», «Bilorichenskyi», «Volnukhinskyi», «Ermusovyskhyl», «Obushok», «Znamyanskyiyar», «Nagolnykryazh», «Nagolchanskyi», «Novozvanivskyi» «Sandy», «Urochishche Murzyne», «Balka Skeleva» and others. Some objects of nature reserve funds were directly damaged by heavy artillery shelling – «Svyati Hory» National Nature Park, a branch of the Ukrainian Steppe Reserve «Kalmiuske», «Chalk Flora», «Donetsk Kryaz» Regional Landscape Park, «Slavyansky Resort», «Kreidene», «Bilogorivskyi», «Perevalskyi» reserves, etc. [8].

Unfortunately, damage to protected areas by war and their occupation lead to the progression of negative processes. The presence of a large number of eruptions from projectile bursts led not only to the physical destruction of vegetation but also to significant chemical pollution. Such a change in the chemical parameters of the soil turned out to be attractive for many aggressive introduced plants, which became the reason for their significant spread in the war zone, in particular, in many protected areas.

Luhansk region is one of the regions of Ukraine that contains the largest number of territories in a natural state. About half of its area is occupied by steppes, river floodplains, chalk outcrops, and forests. The oldest nature reserves here were created back in 1928 («Strlitsivsky Steppe», «Provalsky Steppe»). The oldest nature reserves here were created back in 1928 («Strlitsivsky Steppe», «Provalsky Steppe»). At the time of the occupation of part of the territory of the Luhansk region in 2014, 195 territories and objects of the nature reserve fund with a total area of about 85,000 hectares were functioning in the region. 79 of them were in the occupied territory (20,300 hectares), which is 23.8% of the area of the nature reserve fund of the Luhansk region. Of these, 35 territories (73% of the entire occupied nature reserve fund) were in one way or another

affected by military operations. In particular, almost all of these objects burned down during fires caused by military actions [3].

There are also war-affected territories and nature reserve fund facilities in the controlled territory. A total of 35 objects with a total area of 10,400 hectares. Almost all of them are located in floodplain forests along the Siverskyi Donets River. In consideration of the fact that this area is largely unmined and lies along the demarcation line, it is still difficult to imagine eliminating the damage or preventing new damage. Another number of territories of the nature reserve fund in the northern part of the Luhansk region were damaged during the construction of fortifications by the Armed Forces of Ukraine. The administration of the Luhansk Nature Reserve is located in Stanytsia-Luhanska, which is also in the gray zone [3].

Taking advantage of the lack of real control on the territory of certain protected objects, including those far from the ATO area, arbitrary activity began. For example, more than 100 hectares of steppe areas were arbitrarily plowed on the territory of the «Kramatorsky» RLP, within the boundaries of the «Izyumska luka» regional landscape park in the Kharkiv region, mass felling of forests is carried out, the facts of the installation of hunting towers and hunting were discovered.

The second stage of the destruction of the natural reserve of Ukraine by the Russian

Federation began with the full-scale invasion of Russian troops into Ukraine on February 24, 2022. The territories and objects of the nature reserve fund of Zhytomyr, Kyiv, Sumy, Chernihiv, Kharkiv, Donetsk, Luhansk, Zaporizhzhya, Kherson and Mykolaiv regions were hit by this attack. The real level of damage to the objects of the nature reserve fund due to the war is currently difficult to assess. After all, active hostilities continue in many places; numerous restrictions are created for environmental protection activities in the temporarily occupied territories. There are large numbers of fallen missiles and unexploded ordnance scattered throughout Ukraine, which will pose a potential danger to both people and the environment for many decades to come. Natural ecosystems also suffer due to fortification construction, damage to them by explosions, military transport, fires, etc. [5].

According to the official data of the specialized committee on environmental policy and natural use of the Verkhovna Rada of Ukraine, as of September 1, 2022. The aggressor carried out active combat operations on the territory of 900 objects of the nature reserve fund with an area of 12,406.6 km<sup>2</sup> (1.24 million hectares), which is about a third of the area of the nature reserve fund of Ukraine (Fig.1). About 200 territories of the Emerald Network with an area of 2.9 million hectares are under threat of destruction [5].

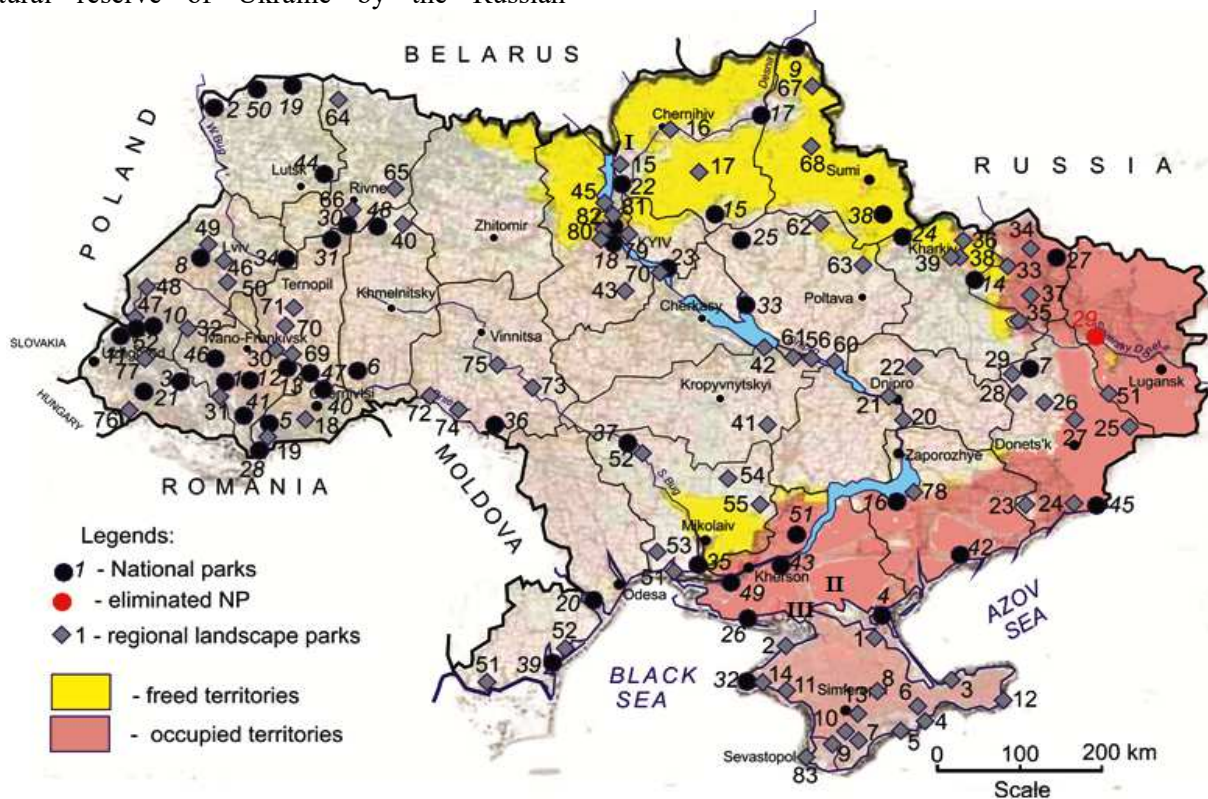


Fig. 1. Network National Natural Parks and Regional Landscape Parks in the occupied and liberated territories of Ukraine, as of September 1, 2022

Part of the national natural parks was in the zone of humanitarian crisis. Some nature conservation areas are deprived of the opportunity to receive funding. For example, in the objects of the nature reserve fund. There is a large population of wild animals, in particular, the «Askania-Nova» biosphere reserve: a variety of animal species are collected and live freely here. Some are in very limited quantities on a global scale, unique for the entire world), national natural parks «Azov-Syvaskyi», «Dzharylgatskyi», nature reserve «Yelanetsky Steppe», as well as the Mykolaiv, Kyiv and Kharkiv zoos are currently unable to buy feed for animals. The regional landscape park «Feldman Ecopark» in the Dergachiv district of the Kharkiv region suffered devastating consequences. The main component of the eco-park is the zoo, which housed about 2,000 animals. Unfortunately, in extreme conditions, animals die not only from injuries, but also from a broken heart. Animals that are constantly in the line of fire experience constant stress, which negatively affects their mental state and behavior [5].

According to Protocol I of the Geneva Conventions of August 12, 1949, relating to the Protection of Victims of International Armed Conflicts, adopted in 1977. Belligerent states are required to protect the natural environment against «extensive, lasting and serious damage» and prohibit methods or means of waging war «which are intended or may lead to the infliction of such damage» [9].

Rio on Environment and Development declares that war is inherently a threat to

sustainable development. Therefore, states respect international law, which ensures the protection of the environment during an armed conflict, and, if necessary, also cooperates for its further development. Therefore, states respect international law, which ensures the protection of the environment during an armed conflict, and, if necessary, also cooperates for its further development. Russia's military actions are undoubtedly an unjustified and unprovoked act of aggression against independent and sovereign Ukraine, as well as a violation of all existing norms of international law regarding nature protection [9].

According to our calculations, as a result of the full-scale invasion of the Russian army into Ukraine after February 24, 2022, 23 large-scale nature reserve fund objects of national significance suffered significant losses and damages (Table 2). Among them are 3 biosphere reserves: Chernobyl radiation-ecological reserve (226,964.7 ha), «Askania-Nova» named after Friedrich Eduardovich Falz-Fein (33,307.6 ha), Black Sea biosphere reserve (109,254.8 ha); 2 nature reserves: «Derevlyanskyi» (30,873 hectares), Ukrainian steppe Nature Reserve «Khomutovsky Step» (1030.5 hectares) and 18 national nature parks with a total area of over 500,000 hectares. The national nature parks of the Donetsk region «Svyati Hory» and «Meotyda» have completely entered the temporarily occupied zone. About 20 regional landscape parks, hundreds of sanctuaries, natural monuments, and protected tracts also fell into the combat zone.

Table 2

**Main objects and territories of nature reserve fund Ukraine who suffered from the military aggression of the russian federation after February 24, 2022 [12]**

№ on the map of Fig. 2	Object name Main objects and territories	Region	Area, ha
I	Chernobyl radiation-ecological Biosphere Reserve	Kyiv region	226 964.7
80	Nature Reserve «Derevlyanskyi»	Zhytomyr region	30 873.0
22	National Natural Park «Zalissya»	Chernihiv region	14 836.0
17	National Natural Park «Mezinskyi»	Chernihiv region	31 035.0
15	National Natural Park «Ichnyanskyi»	Chernihiv region	9665.8
9	National Natural Park «Desnyano-Starogutskyi»	Sumy region	16 214.0
38	National Natural Park «Hetmanskyi»	Sumy region	23 360.0
24	National Natural Park «Slobozhanskyi»	Kharkiv region	5244.0
27	National Natural Park «Dvorichanskyi»	Kharkiv region	3131.2
14	National Natural Park «Gomilshanski Lisy»	Kharkiv region	14 315.0
7	National Natural Park «Svyati Hory»	Donetsk region	40 590.0
45	National Natural Park «Meotyda»	Donetsk region	20 721.0
23	Ukrainian steppe Nature Reserve «Khomutovsky Step»	Donetsk region	1030.5
16	National Natural Park «Velyky Luh»	Zaporizhzhia region	16 756.0
42	National Natural Park «Pryazovskyi»	Zaporizhzhia region	78 127.0
II	Biosphere Reserve «Askania-Nova»	Kherson region	33 307.6
III	Chornomorskyi Biosphere Reserve	Kherson region	109 254.8



4	National Natural Park «Azov-Syvaskyi»	Kherson region	52 582.7
43	National Natural Park «Oleshkiyski Pisky»	Kherson region	11 671.0
26	National Natural Park «Dzharylgatskiy»	Kherson region	10 000.0
35	National Natural Park «Biloberezhzha Svyatoslava»	Mykolayiv region	35 223.0
49	National Natural Park «Nyzhn'odniprovs'kiy»	Kherson region	80 177.8
51	National Natural Park «Kamianska Sich»	Kherson region	12 261.0

**Conclusions.** The analysis of available information sources made it possible to generalize and systematize information about the impact of the Russian-Ukrainian war on the objects and territories of the Nature Reserve Fund of Ukraine. During the first act of aggression, since February 2014, Russia illegally occupied the territories of about 320 Nature Reserve Fund objects with a total area of more than 302 thousand hectares. In particular, 25.2% of the Nature Reserve Fund (40 objects with an area of 23,000 hectares) came under occupation in the Donetsk region, 23.8% in Luhansk region (79 objects with an area of 20,300 hectares), and 100% in the Autonomous Republic of Crimea Nature Reserve Fund of the peninsula (more than 200 objects with a total area of 258,707 hectares).

For the second act of aggression and full-

scale war against Ukraine, from February 24, 2022, the Russian Federation completely illegally seized all territories and objects of the Nature Reserve Fund of the Donetsk and Luhansk regions. 3 biosphere reserves and 18 national nature parks of Ukraine in the Kyiv, Sumy, Chernihiv, Kharkiv, Zaporizhzhya, and Kherson regions came under occupation. In total, in the months of February-March 2022, the Russian army caused damage to the Nature Reserve Fund of Ukraine on an area of about 880.3 thousand hectares. The key problem of the nature protection aspect of the Russian-Ukrainian war is not only the illegal occupation of valuable natural landscapes of our country but also their destruction. Cases of mining the territories of protected objects, uncontrolled deforestation, destruction of rare species of flora and fauna, etc. have already been recorded.

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## Анотація:

**Любомир ЦАРИК, Ігор КУЗИК. РОСІЙСЬКО-УКРАЇНСЬКА ВІЙНА: ПРИРОДООХОРОННИЙ АСПЕКТ**

За результатами дослідження природоохоронного аспекту російсько-української війни встановлено, що з 2014 року російська федерація незаконно захопила та знищила близько пів тисячі об'єктів природно-заповідного фонду України, загальною площею понад 1,2 млн. га. Під окупацію потрапили 3 біосферні заповідники, 14 природних заповідників, 19 національних природних парків, десятки регіональних ландшафтних парків, сотні заказників, пам'яток природи, заповідних урочищ, а також ботанічні сади, дендрологічні парки, зоопарки та парки-пам'ятки садово-паркового мистецтва. Від військової агресії росії постраждали такі відомі заповідні об'єкти, як біосферний заповідник «Асканія Нова», Чорноморський біосферний заповідник, національні природні парки «Слобожанський», «Гомільшанські ліси», «Святі гори», «Меотида», «Олешківські піски», Український степовий природний заповідник «Хомутовський степ». Практично знищено усе виводне біорізноманіття природоохоронних територій, порушено унікальні ландшафти, ліквідовано або вивезено усі наукові напрацювання фахівців природно-заповідних об'єктів. Зафіксовано випадки мінування заповідних територій, неконтрольованих вирубок лісів, знищення рідкісних видів флори і фауни тощо.

На першому етапі агресії, у 2014 році, росія незаконно окупувала 100% природно-заповідного фонду півострова Крим, 25,2% природно-заповідного фонду Донецької області, 23,8% природно-заповідного фонду Луганської області. На другому етапі агресії та повномасштабної війни проти України, з 24 лютого 2022 року, російська федерація повністю захопила усі території та об'єкти природно-заповідного фонду Донецької і Луганської областей, а також значну частину цінних природоохоронних територій Київської, Сумської, Чернігівської, Харківської, Запорізької та Херсонської областей. Станом на 01.10.2022 року. Сьогодні значна частина території України, у тому числі природоохоронних територій звільнена від окупації. Проте оцінити збитки завданні національному природно-заповідному фонду, поки що доволі важко. Тому перспективою подальших науково-практичних досліджень залишається проведення оцінки, завданих збитків заповідними об'єктами і територіям сходу і півдня України.

**Ключові слова:** війна, російська агресія, національні природні парки, природні заповідники, біосферні заповідники, флора, фауна.

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