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NATURE-RESOURCE POTENTIAL OF NATURAL REGIONS OF UKRAINE IN PRESENT-DAY FIGURES

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The value of the aggregative nature-resource potential (NRP) of Ukrainian natural regions was as of 01.01.2022 estimated to amount to 1395,543 milliard hryvnyas. Estimation of aggregative NRP previously performed in 2013 in 2004–2008 prices was now figured through indexation of monetary evaluation of mineral, water, land, forest, fauna and natural recreation resources within natural regions of Ukraine. NRP estimation was performed for each of 278 primary natural physic-geographical rayons of Ukraine, 57 oblasts, 14 krays (provincial ecosystems, according to M. Holubets), 3 sub-zones, 4 zones (biomes) and 3 natural countries (two of which representing mountain country ecosystems). It is asserted that the NRP of the East-European Plain has covers over 9/10 of the total cost value of the potential nature resources of Ukraine, while the Crimean Mountains account for less than 2%, and the Ukrainian Carpathians – for 6,4%. The leadership among “provincial ecosystems” (krays) was taken by the Donetsk Kray (in the Steppe Biome) (14,3% out of the whole NRP of Ukraine), followed by the Podilsko-Prydniprovskyy Kray (in the Forest-Steppe Biome) (11,6%), Left-Bank-Dnieper-Pryazovskyy Kray (in the Steppe Biome) (10,5%), Dniester-Dnieper Kray (in the Steppe Biome) (9,4%), and the Polissia Kray (in the Mixed Forest Biome) (9,3%), West-Ukrainian Kray (in the Deciduous Forests Biome) (8,2%), Left-Bank-Dnieper Kray (in the Forest-Steppe Biome) (7,8%), mountain country ecosystem Ukrainian Carpathians (6,4%). The aforesaid five provincial ecosystems accumulate over 77% of the potential of nature resources of Ukraine. The least NRP values were observed in the Crimean Mountain Country Ecosystem (1,9%), the Prychornomorsko-Pryazovskyy Provincial Ecosystem (2,8%), the East-Ukrainian Provincial Ecosystem (3,2%), Crimean Steppe (3,9%) the Prychornomorskyy (5,0%) and the Zadonetsko-Donskyy (5,7%) provincial ecosystems. *Key words:* nature-resource potential, indexation, natural regions of Ukraine.

Природно-ресурсний потенціал природних регіонів України у сучасному вимірі. Руденко С.В., Руденко В.П.

Вартісна оцінка сумарного природно-ресурсного потенціалу (ПРП) природних регіонів України станом на 01.01.2022 р. становить 1395, 543 млрд. грн. Величина сучасного потенціалу природних ресурсів регіонів визначена шляхом індексації у цінах 2015–2021 років еколого-економічної оцінки ПРП України, проведеної авторами у 2013 р. ПРП регіонів охоплює мінеральні, водні, земельні, лісові, фауністичні та природні рекреаційні ресурси. Оцінка ПРП доведена до рівня первинних 278 природних районів України та відображена у її 57 природних областях, 14 краях (провінційних екосистемах, за М. Голубцем), 3 підзонах, 4 зонах (біомах), 3 природних країнах (з них дві – гірськокарпатські екосистеми). Стверджується, що ПРП Східно-Європейської рівнини складає 9/10 сумарної вартісної оцінки потенціалу природних ресурсів України, Кримські гори – менше 2%, Карпати – 6,4%. На рівні країв («провінційних екосистем») за величиною ПРП першими є: Донецький край (у Степовому біомі) (14,3% від загальноукраїнського ПРП), Подільсько-Придніпровський край (у Лісостеповому біомі) (11,6%), Лівобережно-Дніпровсько-Приазовський край (у Степовому біомі) (10,5%), Дністровсько-Дніпровський край (у Степовому біомі) (9,4%), а також Поліський край (у біомі мішаних лісів) (9,3%), Західно-Український край (у біомі широколистяних лісів) (8,2%), Лівобережно-Дніпровський край (у Лісостеповому біомі) (7,8%) та гірськокарпатська екосистема Українські Карпати (6,4%). Названі провінційні екосистеми утримують понад 77% усього потенціалу природних ресурсів України. Найменший ПРП мають Кримська гірськокарпатська екосистема (1,9%), Причорноморсько-Приазовська (2,8%), Східно-Українська (3,2%), Кримська степова (3,9%), Причорноморська (5,0%) та Задонецько-Донська (5,7%) провінційні екосистеми. *Ключові слова:* природно-ресурсний потенціал, індексація оцінки, природні регіони України.

Problem statement and topicality. In present-day conditions of social-economic and environmental development of Ukraine and the world on the whole, when years of Russian aggression against Ukrainian state and its people pose a challenge to survival of Ukrainian nation, when Ukrainians fight for their Liberty, Independence, Victory and Peace, the assessment of nature-resource potential (NRP) of Ukrainian regions, perhaps like never before, becomes even the most essential issue. What is the nature-resource strength of this state? What is the contribution of the country's krays and rayons in provision of defensive capacity of Ukraine? Are all of nature-resource reserves already employed and

where the same are not yet operationalized to their full? These and many other questions can find response in the form of the up-to-date monetary ecological-economic evaluation of the NRP of Ukrainian territories (water areas) that includes mineral, water, land, forest, fauna and natural recreation resources.

Analysis of latest studies and publications. Problems of assessment of NRP of the territory (water area), in particular, tourism/recreation potential, have in the last years been given attention in quite a number of scientific works. Among those most closely related to this research, there were studies by M. Malska, N. Pankiv [1], С.Е. Chasovschi [2], G.-L. Cioban [3],

H. Haubrich [4], A.-M. Nedelea [5], O. Beidyk and N. Novosad [6], S. Yaromenko [7]. Thus, performing monetary evaluation of tourism potential, M. Malska and N. Pankiv paid attention to high-priority estimation of tourism resources as its major component. We can not but agree with the authors insisting that “the cadastre should be the foundation of economic assessment of natural recreation resources. ...cadastre system of assessment stays to be a basis in the management of the major portion of nature resources, namely, land, water, forest, mineral resources” [1, p. 88]. The establishment of the value of the aggregative nature-resource potential of Ukrainian natural regions in the present-day cost dimension, commensurable with the other important elements of national wealth represents the *major aim* of this study.

Study methods. Undoubtedly, it is the NRP cadastre-based assessments that allow for monetary evaluation of the overall nature-resource wealth of the state and its regions as a whole. In present-day conditions, when the large-scale ecological-economic assessment of Ukrainian NRP is impossible, it seems worth accentuating upon the existing methods of its indexation. The State Service of Ukraine for Geodesy, Cartography and Cadastre performs the indexation of normative monetary evaluation of lands on a yearly basis by way of the cumulative method. Thus, the coefficient of indexation of normative monetary evaluation for agricultural lands (plough lands, perennial plantings, hayfields, pastures and grasslands) in 1996 and until 2021 was 4,796, while it amounted to 6,679 for lands of settlements and other lands of non-agricultural designation within the same period [8].

The use of exchange rates of leading currencies, in particular, the UAH/USD exchange rates established

by the National Bank of Ukraine [9] is, to our opinion, another close and even more appropriate approach to indexation of total NRP of Ukrainian regions. It should be at the same time noted that we speak about the UAH/USD rate averaged within the five-seven years’ period. The appropriateness of this approach was substantiated by many researchers, in particular, by I. Yukhnovsky and G. Loboda [10].

Thus, if the UAH/USD exchange rate stayed in 1996 preserved within the interval of 1.76–1.823 hryvnias per dollar, it grew to 5.00 in 2004–2008; 6.27 in 2006–2010; 15.55 in 2011–2017; and, finally, 25.866 in 2015–2021 (Archive of currency exchange rates, 2023). Hence we observe that the hryvnia’s capacity against the US dollar reduced 15,28 times within 1996–2021, and 5,1732 times within 2015–2021 in comparison to 2004–2008 (see Fig. 1).

The comparison of the periods of 2004–2008 and 2015–2021 was not a random choice. The matter is that, guided by the new scheme of physic-geographical zoning, we had in 2013 performed the absolute ecological-economic evaluation of natural regions of Ukraine in the aspect of its 278 natural rayons, 57 oblasts, 14 krays, 3 subzones, 4 zones, and 3 countries [11].

The choice of physic-geographical (natural) rayon as the primary/the lowest non-zonal object of NRP ecological-economic evaluation was substantiated by the integrity and genetic interrelationship of landscape localities, as well as by the intensity and orientation of modern nature-resource processes. The present-day assessment of Ukrainian NRP is as well important due to new administrative and territorial structure of the state introduced in December 2020, the one that required essential territorial reconsideration and reinterpretation

Hryvnia/USD

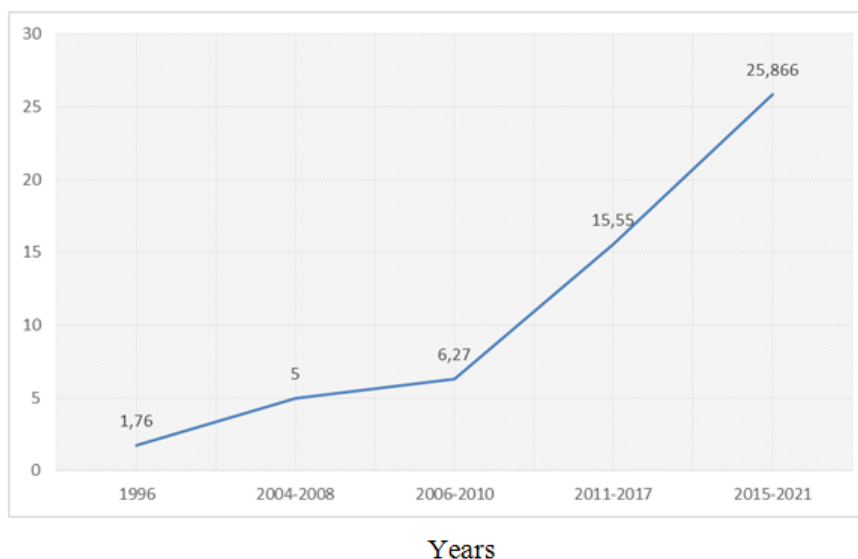


Fig. 1. UAH/USD exchange rate withing 1996–2021 (Archive of currency exchange rates, 2023)

of the available database of cadastre evaluations of nature resources. Thus, the coefficient of indexation of ecological-economic value of NRP of Ukrainian natural regions in 2004–2008 prices in reference to its present-day estimation in 2015–2021 prices has made 5.1732.

Results and Discussion. Table 1 represents the results of indexation of ecological-economic value of nature-resource potentials of natural countries, natural zones, sub-zones and oblasts of Ukraine as of 01.01.2022. As follows from the data, the present-day NRP of Ukraine is counted to amount to 1395, 543 milliard hryvnyas. Here we speak of the NRP value in average annual figures. The East European Plain possesses the potential of nature resources that covers over 9/10 of the whole NRP of Ukraine; the Crimean Mountains (Crimean Mountain Country Ecosystem, according to M. Holubets) account for nearly 2%; and the Ukrainian Carpathians (Carpathian Mountain Country Ecosystem [12]) – for 6,4% of the same.

NRP distribution by Ukrainian natural zones (biomes) is as follows: Mixed Forests Zone is attributable to 9,3%; Deciduous Forests Zone – 8,2%; Forest-Steppe Zone – 22,6%; and Steppe Zone – to 51,6%.

It seems essentially important from scientific point of view to trace the distribution of the value of the aggregative NRP by natural krays, or, according to M. Holubets, provincial ecosystems [12, p. 83].

As follows from Table 1, the leadership among “provincial ecosystems” krays was taken by the Donetsk Kray (in the Steppe Biome) (14,3% out of the whole NRP of Ukraine), followed by the Podilsko-Prydniprovskyy Kray (in the Forest-Steppe Biome) (11,6%), Left-Bank-Dnieper-Pryazovskyy Kray (in the Steppe Biome) (10,5%), Dniester-Dnieper Kray (in the Steppe Biome) (9,4%), and the Polissia Kray (in the Mixed Forest Biome) (9,3%). The aforesaid five provincial ecosystems accumulate over 55% of the potential of nature resources of Ukraine. The least NRP values were observed in the Crimean Mountain Country Ecosystem (1,9%), the Prychornomorsko-Pryazovskyy Provincial Ecosystem (2,8%), and the East-Ukrainian Provincial Ecosystem (3,2%).

Among natural oblasts, the biggest NRP values were manifested by the Donetsk Upland Oblast where 8,8% of the total Ukrainian NRP were accumulated, the South-Prydniprovsk Slope-Upland Oblast in the North-

Table 1

Nature-resource potential of physico-geographical (natural) regions of Ukraine in present-day figures (in prices of 2015–2021)

Physico-geographical countries and zones	Value of the potential (UAH milliard)						
	Mineral	Water	Land	Forest	Fauna	Natural recreation	Integral
1	2	3	4	5	6	7	8
East European Plain	383,613	153,152	591,308	40,506	6,487	104,679	1279,745
Mixed Forests Zone	6,042	26,119	64,537	17,796	0,807	14,045	129,346
Polissia Kray	6,042	26,119	64,537	17,796	0,807	14,045	<u>129,346</u>
I. Oblast of Volyn Polissia	1,045	5,323	11,660	5,970	0,129	2,488	26,616
II. Oblast of Smaller Polissia	0,864	1,888	7,786	1,288	0,047	1,117	12,990
III. Oblast of Zhytomyr Polissia	1,733	6,229	16,244	4,501	0,264	1,987	30,957
IV. Oblast of Kyiv Polissia	1,029	3,280	6,689	2,297	0,057	2,959	16,311
V. Oblast of Chernigiv Polissia	0,993	7,103	15,075	2,043	0,217	4,925	30,356
VI. Oblast of Novgorod-Siversk Polissia	0,378	2,297	7,082	1,697	0,093	0,569	12,116
Deciduous Forests Zone	8,272	16,911	72,927	5,877	0,414	10,460	114,861
West-Ukrainian Kray	8,272	16,911	72,927	5,877	0,414	10,460	<u>114,861</u>
VII. Volyn Upland Oblast	1,562	2,437	12,669	1,392	0,103	1,490	19,653
VIII. Roztoky-Opillia Hilly-Mountainous Oblast	4,454	3,818	7,791	1,743	0,036	3,016	20,858
IX. West-Podillia Upland Oblast	0,533	3,870	15,390	0,983	0,047	1,583	22,406
X. Mid-Podillia Upland Oblast	0,755	4,930	25,711	1,138	0,191	2,090	34,815
XI. Prut-Dniester Upland Oblast	0,967	1,857	11,366	0,621	0,036	2,281	17,128
Forest-Steppe Zone	21,790	36,906	214,935	12,023	2,411	26,947	315,012
Podilsko-Prydniprovskyy Kray	7,754	17,169	117,908	6,363	1,086	11,837	<u>162,117</u>

Continuation of Table 1

1	2	3	4	5	6	7	8
XII. North-Prydniprovskia Upland Oblast	0,435	2,323	11,552	0,440	0,098	1,107	15,955
XIII. North-Eastern Prydniprovskia Upland Oblast	0,786	1,981	15,825	0,957	0,238	1,852	21,639
XIV. Kyiv Upland Oblast	0,595	1,919	9,519	0,626	0,057	2,318	15,034
XV. Prydnistrovsko-East-Podilska Upland Oblast	0,341	0,973	11,774	0,455	0,057	0,569	14,169
XVI. Mid-Bug Upland Oblast	0,450	2,783	15,147	1,076	0,093	1,728	21,277
XVII. Central-Prydniprovskia Upland Oblast	2,276	4,345	22,152	1,547	0,238	2,297	32,855
XVIII. South-Podilska Upland Oblast	0,450	0,771	13,481	0,667	0,145	0,781	16,295
XIX. South-Prydniprovskia Upland Oblast	2,421	2,074	18,458	0,595	0,160	1,185	24,893
Left-Bank-Dnieper Kray	10,409	13,962	72,756	3,346	1,051	7,387	<u>108,911</u>
XX. North-Prydniprovskia Terrace Lowland Oblast	1,604	3,844	21,769	0,786	0,264	3,057	31,324
XXI. North-Poltava Upland Oblast	4,149	4,366	27,775	1,298	0,383	2,240	40,211
XXII. East-Poltava Upland Oblast	1,640	4,728	13,781	1,040	0,285	1,485	22,959
XXIII. South-Prydniprovskia Terrace Lowland Oblast	3,016	1,024	9,431	0,222	0,119	0,605	14,417
East-Ukrainian Kray	58,308	16,581	79,879	2,794	0,884	16,978	<u>175,424</u>
XXIV. Sumy Slope-Upland Oblast	0,466	2,168	9,865	1,221	0,145	1,107	14,972
XXV. Kharkiv Slope-Upland Oblast	3,161	3,606	14,407	1,092	0,129	6,617	29,012
Steppe Zone	347,509	73,216	238,909	4,810	2,855	53,227	720,526
North-Steppe Sub-Zone	333,716	37,045	148,374	3,839	1,970	31,805	556,749
Dniester-Dnieper Kray	54,681	10,807	55,607	0,481	0,610	9,254	<u>131,440</u>
XXVI. South-Moldavian Slope-Upland Oblast	0,021	0,797	10,243	0,036	0,041	0,848	11,986
XXVII. South-Podillia Slope-Upland Oblast	0,352	1,847	11,490	0,093	0,109	1,386	15,277
XXVIII. South-Prydniprovskia Slope-Upland Oblast	54,308	8,163	33,874	0,352	0,460	7,020	104,177
Left-Bank-Dnieper-Pryazovskyy Kray	70,594	12,990	50,869	1,205	0,677	9,964	<u>146,299</u>
XXIX. Orilsko-Samarska Lowland Oblast	45,721	5,106	21,702	0,786	0,290	3,694	77,299
XXX. Kinsko-Yalynska Lowland Oblast	20,693	6,110	18,003	0,222	0,248	2,509	47,785
XXXI. Pryazovska Upland Oblast	2,437	1,252	7,765	0,145	0,072	1,624	13,295
XXXII. Pryazovska Lowland Oblast	1,743	0,522	3,399	0,052	0,067	2,137	7,920
Donetsk Kray	157,399	7,935	25,722	0,998	0,238	7,481	<u>199,773</u>
XXXIII. West-Donetsk Slope-Upland Oblast	54,075	2,788	15,639	0,574	0,160	3,073	76,309
XXXIV. Donetsk Upland Oblast	103,324	5,147	10,083	0,424	0,078	4,408	123,464

Continuation of Table 1

1	2	3	4	5	6	7	8
Zadonetsko-Donskyi Kray	51,044	5,313	16,332	1,154	0,445	5,106	<u>79,394</u>
XXXV. Starobilsk Slope-Upland Oblast	51,044	5,313	16,332	1,154	0,445	5,106	79,394
Mid-Steppe Sub-Zone	6,513	12,136	43,454	0,300	0,346	7,305	70,054
Prychornomorskyi Kray	6,513	12,136	43,454	0,300	0,346	7,305	<u>70,054</u>
XXXVI. Zadnistrovsko-Prychornomorska Lowland Oblast	0,057	2,002	7,656	0,036	0,041	0,760	10,552
XXXVII. Dniester-Bug Lowland Oblast	0,274	1,148	6,642	0,036	0,036	4,377	12,513
XXXVIII. Bug-Dnieper Lowland Oblast	1,614	4,827	16,027	0,088	0,145	0,631	23,332
XXXIX. Dnieper-Molochanka Lowland Oblast	1,573	3,714	8,137	0,078	0,088	0,347	13,937
XL. West-Pryazovska Slope-Upland Oblast	2,995	0,445	4,992	0,062	0,036	1,190	9,720
South Steppe (Dry Steppe) Sub-Zone	7,280	24,035	47,081	0,671	0,539	14,117	93,723
Prychornomorsko-Pryazovskyy Kray	1,144	9,782	<u>23,310</u>	0,418	0,285	4,149	<u>39,088</u>
XLI. Lower Bug-Dnieper Lowland Oblast	0,683	3,657	4,739	0,072	0,031	1,402	10,584
XLII. Lower Dnieper Terrace-Delta Lowland Oblast	0,197	1,666	6,047	0,274	0,078	0,848	9,110
XLIII. Prysyvasko-Pryazovska Lowland Oblast	0,264	4,459	12,524	0,072	0,176	1,899	19,394
Crimean Steppe Kray	6,136	14,253	<u>23,771</u>	0,253	0,254	9,968	<u>54,635</u>
XLIV. Prysyvasko -Crimean Lowland Oblast	1,247	5,727	6,492	0,010	0,078	2,550	16,104
XLV. Tarkhankut Upland Oblast	0,202	2,540	7,843	0,005	0,057	2,173	12,820
XLVI. Central Crimean Upland Oblast	0,978	5,784	7,791	0,228	0,103	4,671	19,555
XLVII. Kerch Hilly-Ridge Oblast	3,709	0,202	1,645	0,010	0,016	0,574	6,156
Crimean Mountains	2,530	2,111	8,996	1,257	0,041	11,014	25,949
Crimean Mountainous Kray	2,530	2,111	8,996	1,257	0,041	11,014	25,949
I. Piedmont-Crimean Oblast	1,148	0,927	3,657	0,522	0,015	5,323	11,593
II. Mountainous Crimea Oblast	1,211	0,905	3,673	0,538	0,010	3,735	10,072
III. South Coast Crimean Oblast	0,171	0,279	1,666	0,197	0,016	1,955	4,294
Ukrainian Carpathians	8,179	27,216	19,095	16,430	0,083	18,846	89,849
I. Pre-Carpathian Upland Oblast	4,678	7,863	9,406	5,162	0,043	5,835	32,987
II. Outer-Carpathian Oblast	2,193	6,172	1,914	3,797	0,010	2,302	16,388
III. Vododilno-Verkhovynska Oblast	0,285	4,754	0,735	2,499	0,005	2,002	10,280
IV. Polonynsko-Chornogirska Oblast	0,191	3,647	0,817	2,535	0,005	2,499	9,694
V. Marmaros Oblast	-	0,538	0,036	0,378	-	0,222	1,174
VI. Volcanic-Intermountain-Hollow Oblast	0,341	2,840	2,695	1,583	0,010	3,430	10,899
VII. Zakarpattia Lowland Oblast	0,491	1,402	3,492	0,476	0,010	2,556	8,427
Ukraine	394,322	182,479	619,399	58,193	6,611	134,539	1395,543

Steppe Sub-Zone (7,5%), and the Starobilsk Slope-Upland Oblast in the same sub-zone (5,7%). The least value of the potential was observed in the Marmaros Oblast belonging to the Carpathian Mountain Country Ecosystem (less than 0,1%).

The richness of ecosystems with nature resources and the size of territories of ecosystems themselves undoubtedly determine the volume of their aggregative NRP.

Major conclusions and perspectives of use of the study results. Appropriateness of the use of exchange rates of leading currencies, in particular, the US dollar to Ukrainian hryvnya as established by the National Bank of Ukraine, to indexation of the nature-resource potential of Ukraine was substantiated.

Indexation of previously estimated ecological-economic value of NRP in Ukrainian natural

regions as of 01.01.2022 was performed in 2015–2021 prices.

It was established that the NRP of the East European Plain makes over 9/10 of its total value; the Crimean Mountains account for nearly 2%; and the Ukrainian Carpathians – for 6,4% of the national value.

Among provincial ecosystems, the biggest value of the NRP was observed in the Donetsk, Podilsko-Prydniprovskyy and Left-Bank-Dnieper-Pryazovskyy krays. The Donetsk Upland Oblast possesses the most powerful NRP among all Ukrainian natural oblasts.

The perspectives of further application of the results of the NRP ecological-economic (cost) estimation lie in ecosystems analysis and synthesis of the potential of nature resources at the level of 278 primary natural rayons of Ukraine.

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