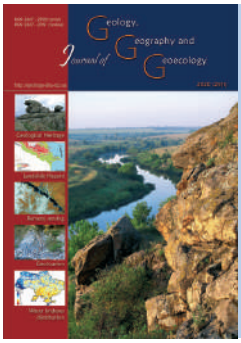

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Concept of ecosystem services and its implementation in Ukraine

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Abstract. Development in harmony with nature is a fundamental social paradigm, the realisation of which depends on fulfilment of basic conditions, namely preservation and restoration of the the natural environment as well as ensuring the ecologically safe functioning of ecosystems. There is a need to find a compromise between the social and economic needs of mankind and the potential of the biosphere to satisfy them. At the present stage of development of society, the tools based on economic interest are the most efficient for the effective use, preservation and restoration of ecosystem functions. The economic contributions of ecosystems are not fully taken into account in the modern economy. This is largely explained by the lack of a coherent scientific approach to defining their nature and lack of methodological tools for their economic evaluation. In this regard, the need arises for undertaking appropriate scientific research and the inclusion of ecosystem services in the activities of business entities. The concept of ecosystem services is based on the need for co-evolutionary development of environmental and economic components. There is no single approach to implementing the concept of ecosystem services that would meet the environmental conditions of every geographical site. Generalisation and systematisation of the provisions of the concept of ecosystem services, verification of the basic mechanisms and their adaptation to the legal and regulatory framework in Ukraine, examination of the conditions of ecosystems and their economic value are necessary for the implementation of the ecosystem approach in the sectors of the Ukrainian economy. The objective of the study is to characterise the progress of development and implementation of the concept of ecosystem services in Ukraine; to define and characterise the ecosystems in Ukraine that are particularly important for the provision of ecosystem services. Scientific principles and consistent patterns in the field of ecology, geography and landscape science provided the methodological basis of the study, which was based on a systematic approach. The cartographic method (based on GIS-technologies), the method of expert estimations and the statistical method were used. ArcGis and Mapinfo Professional software products as well as Google satellite images and electronic vector layers of a topographic map of Ukraine with a scale of 1:200,000 were used to calculate the area of ecosystems within landscapes and create cartographic material. Statistical and cartographic materials, reports from research institutions, regulatory and reference materials, scientific papers written by domestic and foreign scholars provided the information basis of the study. Scientific papers on the classification of ecosystems, ecosystem services and the implementation of the concept of ecosystem services in Ukraine have been analysed. The categories, size and area of ecosystems in Ukraine that are of particular importance for the provision of ecosystem services have been defined, their ecological condition has been assessed and the prevailing ecosystem services have been identified.

Keywords: concept, ecosystem services, ecosystem, landscape, natural capital, ecosystems in Ukraine, landscapes in Ukraine

Концепція екосистемних послуг та її реалізація в Україні

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Анотація. Збереження і відновлення природного середовища, забезпечення екологічно безпечного функціонування екосистем є пріоритетними умовами реалізації панівної суспільної парадигми – розвитку у гармонії з природою. Виникає необхідність пошуку компромісу між соціальними і економічними потребами людства та можливостями біосфери їх задовільняти. У сучасній економіці не повністю враховуються економічні внески цінностей екосистем, що значною мірою пояснюється відсутністю узгодженого наукового підходу до визначення їх сутності та змісту, методичного інструментарію їх економічної оцінки. У зв'язку з цим, виникає необхідність відповідних наукових досліджень та включення екосистемних послуг у діяльність суб'єктів господарювання. Концепція екосистемних послуг заснована на необхідності коеволюційного розвитку екологічної

та економічної складових. Єдиного підходу щодо реалізапції концепції екосистемних послуг, який відповідав би природним умовам конкретних територіальних об'єктів, не існує. Для впровадження екосистемного підходу в сектори економіки України необхідні узагальнення та систематизація положень концепції екосистемних послуг, верифікація основних механізмів та їх адаптація до нормативно-правового поля України, дослідження стану екосистем та їх економічної цінності. Мета дослідження: охарактеризувати стан розроблення та реалізації концепції екосистемних послуг в Україні; виділити та охарактеризувати екосистеми України, що мають особливо важливе значення для надання екосистемних послуг. Методологічною основою дослідження, яке базувалося на системному підході, були наукові принципи і закономірності в галузі екології, географії, ландшафтознавства та ін. Використовувалися картографічний (на основі GIS-технологій), експертних оцінок та статистичний методи. Проаналізовано наукові праці щодо класифікації екосистем, екосистемних послуг та реалізації концепції екосистемних послуг в Україні. Визначено категорії, обсяги, площі екосистем України, що мають особливо важливе значення для надання екосистемних послуг, оцінено їх екологічний стан та визначено переважаючі екосистемні послуги.

Ключові слова: концепція, екосистемні послуги, екосистема, ландшафт, екосистеми України, ландшафти України

Introduction. Development in harmony with nature is a fundamental social paradigm, the realisation of which depends on fulfilment of basic conditions, namely preservation and restoration of the natural environment as well as ensuring the ecologically safe functioning of ecosystems. There is a need to find a compromise between the social and economic needs of mankind and the potential of the biosphere to satisfy them. (Korchemlyuk, Arkhypova, 2016; Prykhodko, 2017; Prykhodko et al, 2019).

At the present stage of development of society, the tools based on economic interest are the most efficient for the effective use, preservation and restoration of ecosystem functions. The economic contributions of ecosystems are not fully taken into account in the modern economy. This is largely explained by the lack of a coherent scientific approach to defining their nature and lack of methodological tools for their economic evaluation (Mishenin et al, 2015). In this regard, the need arises for undertaking appropriate scientific research and the inclusion of ecosystem services in the activities of business entities.

The concept of ecosystem services is based on the need for co-evolutionary development of environmental and economic components. It is introduced in the national policies and legal systems of many countries, has become the basis of a number of international treaties and is presented in the outcome documents of the UN Conference on Continuous Development "Rio+20". The European Biodiversity Strategy requires all EU member states to establish and evaluate ecosystems and ecosystem services at the national level, as well as integrate the results into an overall system of environmental and economic calculations by 2020 (Cili rozvytku tysjacholittja Ukrai'na: 2000-2015, 2015). The ecosystem approach should be implemented in territorial management in Ukraine by 2020, and Ukrainian legislation in this area must harmonise with European legislation.

Works of many foreign and domestic scholars have provided new insights into the theoretical foundations of harmonisation of relations between society and nature, the classification of ecosystems, the standardisation of ecosystem functions, the theory of natural capital and its assessment, the classification of ecosystem services (Didukh, 2005; Brown et al., 2007; Nykyforov et al., 2011; Chan et al., 2012; Costanza, 2012; Daniel et al., 2012; Egoh et al., 2012; Roche, Campagne, 2012; Burkynskyi, Horiachuk, 2013; Plieninger et al., 2014; Förster et al., 2015; Malinga et al., 2015; Martinez-Harms et al., 2015; McDonough et al., 2015; Polasky et al., 2015; Bobylev et al., 2016; Landers et al., 2016; Onyshchenko, 2016; Solovii, 2016; Englund et al., 2017; Jiang, 2017; Olander et al., 2017; Pascual et al., 2017; Wright et al., 2017; HainesYoung, Potschin, 2018; Maes et al., 2018; Holubchak et al., 2019).

There is no single approach to implementing the concept of ecosystem services that would meet the environmental conditions of every specific geographical site. Generalisation and systematisation of the provisions of the concept of ecosystem services, verification of the basic mechanisms and their adaptation to the legal and regulatory framework in Ukraine, examination of the conditions of ecosystems and their economic value are necessary for the implementation of the ecosystem approach in the sectors of the Ukrainian economy.

The objective of the study is to characterise the progress of development and implementation of the concept of ecosystem services in Ukraine; to define and characterise the ecosystems in Ukraine that are particularly important for the provision of ecosystem services.

Research material and research methods. Scientific principles and consistent patterns in the field of ecology, geography and landscape science provided the methodological basis of the study, which was based on a systematic approach. The cartographic method (based on GIS-technologies), the method of expert assessment and the statistical method were used. Statistical and cartographic data, reports from research institutions, regulatory and reference materials, scientific papers written by domestic and

foreign scholars formed the information basis of the study.

Results obtained and their analysis. In the classical sense, an ecosystem is a rankless unit of various dimensions, which is not characterized by territorial restrictions (its size is determined systematically). Therefore, the identification of ecosystems at the territorial level is important for the scientific substantiation and implementation of the concept of ecosystem services. Western European scholars consider the smallest unit of such ecosystems to be "habitat", which is close to "ecotope". According to the definition adopted in the European classification EUNIS (European Nature Information System), an ecotope is a group of plants and animals that forms a biotic environment together with abiotic factors and interacts with other groups in a certain area (Davies, Moss, 2002). In this sense, the concept of "ecotope" is close to that of "biogeocenosis" (Didukh, 2005). When investigating within the landscape, it is advisable to take the "facies" as the smallest ecosystem at the territorial level (Hrodzynskyi, 1993).

The European classification of ecosystems EUNIS has incorporated the advantages of various classifications (Emerald, NATURA 2000, CORINE, Palearctic Habitats), is based on the assessment of ecotope similarity, has a hierarchical structure and includes 11 main types, within which levels of II-VII degree are distinguished. A detailed classification is developed for the western regions of Europe; a less detailed classification is developed for Eastern Europe.

In Ukraine, Y. P. Didukh, T. L. Andriienko, D. M. Hrodzynskyi, A. V. Klimov, A. A. Kuzemko, V. V. Nykyforov, V. A. Onyshchenko, M. A. Son, Y. R. Sheliah-Sosonko and other scholars have focused their research and scientific works on the development of the classification of ecosystems.

In accordance with the pan-European principles of EUNIS, Y. P. Didukh and A. A. Kuzemko have developed a classification of ecosystems for the Halytsko-Slobozhanska Eco-Network (Didukh, Kuzemko, 2005), Y. P. Didukh, T. V. Fitsailo, Y. P. Korotchenko and others have developed a classification of forest biotopes (excluding the Carpathians) and forest-steppe zones of Ukraine (Didukh et al, 2011). The emphasis was placed on the natural biotopes that need to be protected and can form the basis for the scientific substantiation for the creation of new protected sites. A. V. Klimov and others (Klimov et al, 2014) have developed a classification of ecosystems of wetlands in Ukraine. It is based on the physical-geographical and geobotanical zoning of Ukraine (2003), taking into account the typology of natural landscapes of the lowland part of Ukraine (1999). V. A. Onyshchenko has developed a Ukraine-adapted guidebook for the identification of the habitats of I-III levels of the EUNIS classification and the existing habitats in Ukraine under Resolution No. 4 (1996) of the Standing Committee of the Bern Convention as of July 1, 2016 (Onyshchenko, 2016). Also, the classifications have been developed for the individual objects of the Nature Reserve Fund of Ukraine, basin and anthropogenic ecosystems (Aloshkina, 2011; Didukh, Aloshkina, 2012; Kozak, Didukh, 2015).

The definition of ecosystem services as the benefits and values derived from the ecosystem, as well as the entire list of material, energy and information flows created by natural capital reserves, which in combination with physical, human and social capital ensure the well-being of society, is the most common in the scientific literature (Brown et al, 2007).

The basics of the standardisation of ecosystem functions, goods and services are outlined in the article by R. de Groot et al. (De Groot et al, 2002). Ecosystem services and goods provided were considered as the result of their functions evaluated from a human perspective.

Currently, three international classifications of ecosystem services have been developed (Bobylev et al, 2016): 1) Millennium Ecosystem Assessment (MA); 2) The Economics of Ecosystems and Biodiversity (TEEB); 3) Common International Classification of Ecosystem Services (CICES). The CICES classification is based on the two aforementioned classifications, but is more focused on the accounting and economic evaluation of ecosystems at the national, regional and local levels. These classifications are substantially similar and include three main categories of ecosystem services: provisioning – providing people with material goods and resources that they use; regulating – various mechanisms of ecosystems that regulate the environmental indicators that are important for human well-being; cultural – the non-material meeting the cultural, spiritual and scientific needs of people (Bobylev et al, 2016). Work on standardisation and agreement on the list of ecosystem services is in progress (HainesYoung, Potschin, 2018).

To date, there are no general criteria for quantitative assessment of various impacts on ecosystems. Each impact on an ecosystem is determined according to its own rating scale. To assess the condition of ecosystems, the following actions are undertaken: the qualitative composition

and quantitative characteristics of the impacts are determined, the chemical composition of substances and their concentration in ecosystem components are evaluated in order to compare the obtained results with a given standard and evaluate the results from the standpoint of benefit or harm to biota.

The assessment of the value of the ecosystem services depends on the comprehension of these services. It is very difficult to perceive, analyse and evaluate all ecosystem services, as well as forecast how they can change as a result of human activity. Lack of this information results in the underestimation of the value of ecosystem services. Various methods are used to assess the value of ecosystem services depending on what is being considered, how stringent the data requirements are and the limitations that are permissible. (Dykson et al, 2000). It is advisable to use several evaluation methods in parallel to obtain more reliable results.

In Ukraine, B. V. Burkynskyi, V. F. Horiachuk, N. V. Dehtiar, E. V. Mishenin, A. A. Osaul, I. P. Solovii, M. A. Fedorenko and other scholars have written their scientific works on the theory of natural capital and its assessment as well as on research conducted on ecosystem services (as a component of natural capital). In their works, they placed emphasis on the fact that it is especially relevant to solve the problem of the adequate assessment of natural capital while determining the directions of the socio-economic development of the country under the conditions of increasing anthropogenic impact on the natural environment and the need to ensure continuous development of society (Burkynskyi, Horiachuk 2013; Solovii, 2016).

Summing up, it should be noted that the classification of ecosystems in Ukraine and the ecosystem services that they provide are in the process of formation. In order to introduce the concept of ecosystem services in the sectors of the Ukrainian economy, it is necessary to scientifically substantiate, improve and generalise the conceptual and terminological apparatus, classification of ecosystems and ecosystem services, methods for assessing the condition of ecosystems and calculating the cost of ecosystem services; to develop and adopt relevant regulatory legal acts.

According to M. A. Holubets, a landscape ecosystem is a combination of biogeocenotic ecosystems interconnected by genetic relationships, historical connections, geochemical bonds and biotic ties, related by a certain type of economic use according to geological, geomorphological, soil-hydrological and climate indicators and located on a homogeneous area of the earth›s surface. As for spatial boundaries, this category includes any natural-territorial complex (natural boundary, terrain, massif, river basin, etc.) that can be considered as a functional, self-organised and self-regulated energy system (Holubets, 2000).

Such ecosystems provide various priority ecosystem services (for example, forest ecosystems provide regulation and maintenance in mountain landscapes and provisioning in plain landscapes) in different natural environments. Based on this, we have generalised the landscape map of Ukraine in order to link ecosystems to particular territories (Rudenko et al, 2007). As a result, a landscape map at the level of landscape categories has been created. There are 34 landscape categories in Ukraine (Fig. 3).

The research on ecosystems and the ecosystem services that they provide was conducted taking into account the distribution of ecosystems in landscape ecosystems (landscapes) in Ukraine.

According to the EUNIS classification, there are 7 ecosystems (habitats) of the 1st level (Onyshchenko, 2016) that provide basic ecosystem services in Ukraine: B – Coastal habitats; C –Inland surface waters; D – Mires, bogs and fens; E – Grasslands and lands dominated by forbs, mosses or lichens; G – Woodland, forest and other wooded land; I – Regularly or recently cultivated agricultural, horticultural and domestic habitats; J – Constructed, industrial and other artificial habitats.

ArcGis and Mapinfo Professional software products as well as Google satellite images and electronic vector layers of a topographic map of Ukraine with a scale of 1:200,000 were used to determine and calculate the area of ecosystems within landscapes and create cartographic material.

The distribution and percentage share of ecosystems in landscape categories in Ukraine is shown in Table 1 and Figures 1, 2.

Dangerous exogenic processes, technogenic loading, anthropogenic changes in the geological and geomorphological structure as well as the ecological condition of soils, surface water and groundwater, atmospheric air and vegetation cover were analysed to assess the ecological condition of landscape ecosystems in each of the 34 categories of landscapes. The integral indicators of the ecological condition are shown in Figure 3.

According to the CICES V 5.1 classification, ecosystems provide three main types of ecosystem services: 1 – Provisioning; 2 – Cultural; 3 – Regulation and Maintenance. Due to the fact that there is no common method for determining the economic value

Table 1. Distribution and percentage share of ecosystems according to the landscape categories in Ukraine

№ on the map (see Fig. 3.1)	Areas of landscape categories		Ecosystem areas in landscapes (Ecosystem code according to the EUNIS classification: B – Coastal habitats; C – Inland surface waters; D – Mires, bogs and fens; E – Grasslands and lands dominated by forbs, mosses or lichens; G – Woodland, forest and other wooded land; I – Regularly or recently cultivated agricultural, horticultural and domestic habitats; J – Constructed, industrial and other artificial habitats)													
			B		C		D		E		G		I		J	
	km^2	% of the area of Ukraine	km^2	% of the area of the landscape category	km^2	% of the area of the landscape category	km^2	% of the area of the landscape category	km^2	% of the area of the landscape category	km^2	% of the area of the landscape category	km^2	% of the area of the landscape category	km^2	% of the area of the landscape category
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
CLASS : LOWLAND LANDSCAPES																
TYPE : CONIFEROUS AND TEMPERATE DECIDUOUS FOREST LANDSCAPES																
1	21120,6	3,5	–	–	213,5	1,0	1406,4	6,7	4253,7	20,1	8290,9	39,3	6113,9	28,9	842,1	4,0
2	25018,7	4,1	–	–	154,3	0,6	731,6	2,9	3120,1	12,5	10425,1	41,7	9511,4	38,0	1076,1	4,3
3	30110,2	5,0	–	–	1458,4	4,8	1203,7	4,0	5356,2	17,8	11513,1	38,2	9578,6	31,8	1000,1	3,3
4	6433,0	1,1	–	–	28,2	0,4	318,2	4,9	953,7	14,8	2029,2	31,5	2879,9	44,8	223,9	3,5
total:	***82682,5***	***13,7***	**–**	**–**	***1854,4***	***2,2***	***3659,9***	***4,4***	***13683,7***	***16,5***	***32258,3***	***39,0***	***28083,8***	***34,0***	***3142,2***	***3,8***
TYPE : TEMPERATE DECIDUOUS FOREST LANDSCAPES																
5	54710,7	9,1	–	–	503,3	0,9	357,0	0,7	7329,4	13,4	8646,6	15,8	35026,3	64,0	2848,0	5,2
total:	***54710,7***	***9,1***	**–**	**–**	***503,3***	***0,9***	***357,0***	***0,7***	***7329,4***	***13,4***	***8646,6***	***15,8***	***35026,3***	***64,0***	***2848,0***	***5,2***
TYPE : FOREST-STEPPE LANDSCAPES																
6	69790,6	11,6	–	–	1460,2	2,1	170,3	0,2	5025,7	7,2	7599,29	10,9	52127,3	74,7	3407,9	4,9
7	2792,3	0,5	–	–	247,4	8,9	11,6	0,4	125,7	4,5	721,4	25,8	1495,1	53,5	191,2	6,8
8	72905,7	12,1	–	–	4972,9	6,8	1151,1	1,6	8936,7	12,3	6405,2	8,8	48086,1	66,0	3353,6	4,6
9	18911,6	3,1	–	–	212,7	1,1	138,4	0,7	4328,3	22,9	2955,2	15,6	10383,0	54,9	894,1	4,7
total:	***164400,2***	***27,3***	**–**	**–**	***6893,2***	***4,2***	***1471,4***	***0,9***	***18416,4***	***11,2***	***17681,1***	***10,8***	***112091,5***	***68,2***	***7846,8***	***4,8***
TYPE : STEPPE LANDSCAPES																
SUBTYPE : NORTHERN STEPPE FORB-FESCUE-FEATHER GRASS LANDSCAPES WITH RAVINE OAK GROVES																
10	54724,4	9,1	–	–	2801,2	5,1	29,0	0,1	8658,3	15,8	860,7	1,6	40333,5	73,7	2041,8	3,7
11	4237,1	0,7	50,3	1,2	429,5	10,1	3,3	0,1	213,9	5,0	36,5	0,9	3320,3	78,4	183,4	4,3
12	18025,8	3,0	–	–	202,1	1,1	4,4	0,0	4129,5	22,9	395,9	2,2	12914,7	71,6	379,1	2,1
13	23309,6	3,9	–	–	974,1	4,2	144,6	0,6	3541,4	15,2	555,8	2,4	17107,3	73,4	986,5	4,2
14	13440,6	2,2	–	–	229,7	1,7	4,9	0,0	2750,6	20,5	531,3	4,0	9015,4	67,1	908,6	6,8
15	10902,5	1,8	–	–	103,7	1,0	3,9	0,0	1125,1	10,3	816,1	7,5	8241,6	75,6	612,1	5,6
16	20121,8	3,3	–	–	166,6	0,8	73,5	0,4	2954,8	14,7	2126,0	10,6	14163,0	70,4	637,9	3,2
total:	***144761,8***	***24,0***	***50,3***	***0,0***	***4906,9***	***3,4***	***263,6***	***0,2***	***23373,6***	***16,1***	***5322,3***	***3,7***	***105095,8***	***72,6***	***5749,4***	***4,0***
SUBTYPE : MID-LATITUDE STEPPE FESCUE-FEATHER GRASS LANDSCAPES																
17	5167,1	0,9	24,0	0,5	308,6	6,0	0,6	0,0	125,8	2,4	28,4	0,5	4531,0	87,7	148,9	2,9
18	25936,1	4,3	12,2	0,0	2096,4	8,1	109,8	0,4	1540,9	5,9	262,6	1,0	21414,8	82,6	499,3	1,9
total:	***31103,2***	***5,2***	***36,2***	***0,1***	***2405***	***7,7***	***110,4***	***0,4***	***1666,7***	***5,4***	***291***	***0,9***	***25945,8***	***83,4***	***648,2***	***2,1***
SUBTYPE : SOUTHERN STEPPE WORMWOOD-GRASS LANDSCAPES																
19	29077,8	4,8	1640,0	5,6	3559,3	12,2	1322,7	4,5	628,4	2,2	1263,8	4,3	19946,8	68,6	716,8	2,5
total:	***29077,8***	***4,8***	***1640,0***	***5,6***	***3559,3***	***12,2***	***1322,7***	***4,5***	***628,4***	***2,2***	***1263,8***	***4,3***	***19946,8***	***68,6***	***716,8***	***2,5***

Table 1. (continued)

№ on the map (see Fig. 3.1)	**Areas of landscape categories**		**Ecosystem areas in landscapes** (Ecosystem code according to the EUNIS classification: B – Coastal habitats; C – Inland surface waters; D – Mires, bogs and fens; E – Grasslands and lands dominated by forbs, mosses or lichens; G – Woodland, forest and other wooded land; I – Regularly or recently cultivated agricultural, horticultural and domestic habitats; J – Constructed, industrial and other artificial habitats)													
			B		C		D		E		G		I		J	
	km²	*% of the area of Ukraine*	*km²*	*% of the area of Ukraine*	*km²*	*% of the area of Ukraine*	*km²*	*% of the area of Ukraine*	*km²*	*% of the area of Ukraine*	*km²*	*% of the area of Ukraine*	*km²*	*% of the area of Ukraine*	*km²*	*% of the area of Ukraine*
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
SUBTYPE : STEPPE CRIMEAN LANDSCAPES																
20	4752,0	0,8	219,6	4,6	61,6	1,3	237,3	5,0	102,1	2,1	32,1	0,7	3986,5	83,9	112,8	2,4
21	2247,3	0,4	76,0	3,4	162,6	7,2	9,5	0,4	52,2	2,3	18,8	0,8	1902,7	84,7	25,7	1,1
22	3966,5	0,7	43,7	1,1	141,3	3,6	3,4	0,1	63,9	1,6	15,4	0,4	3609,4	91,0	89,5	2,3
23	4959,3	0,8	83,9	1,7	153,5	3,1	1,4	0,0	76,7	1,5	0,5	0,0	4593,5	92,6	49,8	1,0
total:	***15925,1***	***2,7***	***423,2***	***2,7***	***519,0***	***3,3***	***251,6***	***1,6***	***294,9***	***1,9***	***66,8***	***0,4***	***14092,1***	***88,5***	***277,8***	***1,7***
FLOODPLAIN LANDSCAPES OF PLAINS																
24	35898,0	5,9	32,5	0,1	3198,5	8,9	2231,4	6,2	2678,3	7,5	5365,7	14,9	19951,3	55,6	2440,4	6,8
total:	***35898,0***	***5,9***	***32,5***	***0,1***	***3198,5***	***8,9***	***2231,4***	***6,2***	***2678,3***	***7,5***	***5365,7***	***14,9***	***19951,3***	***55,6***	***2440,4***	***6,8***
CLASS : MOUNTAIN CARPATHIAN LANDSCAPES																
TYPE : FOREST-MEADOW LANDSCAPES WITH SUBALPINE MEADOWS (POLONYNAS)																
25	12879,0	2,1	–	–	77,8	0,6	54,5	0,4	2557,4	19,9	3454,7	26,8	5930,1	46,0	804,5	6,2
26	7995,7	1,3	–	–	3,3	0,0	0,0	0,0	453,2	5,7	5360,4	67,0	1914,5	23,9	264,4	3,3
27	2201,0	0,4	–	–	5,4	0,2	1,2	0,1	43,7	2,0	1311,7	59,6	761,9	34,6	77,1	3,5
28	7529,4	1,2	–	–	1,7	0,0	0,0	0,0	184,4	2,4	6516,0	86,5	742,1	9,9	85,2	1,1
29	267,4	0,0	–	–	0,0	0,0	0,0	0,0	16,8	6,3	241,1	90,1	8,9	3,3	0,8	0,3
30	546,1	0,1	–	–	0,1	0,0	0,0	0,0	194,1	35,5	349,8	64,1	0,4	0,1	1,7	0,3
total:	***31418,6***	***5,1***	–	–	***88,3***	***0,3***	***55,7***	***0,2***	***3449,6***	***11,0***	***17233,7***	***54,9***	***9357,9***	***29,8***	***1233,7***	***3,9***
CLASS : MOUNTAIN CRIMEAN LANDSCAPES																
TYPE : FOREST-MEADOW LANDSCAPES WITH MOUNTAIN PASTURES (YAILAS)																
31	1283,2	0,2	–	–	2,3	0,2	1,0	0,1	15,8	1,2	215,6	16,8	1023,2	79,7	25,4	2,0
32	5181,0	0,9	15,1	0,3	38,0	0,7	0,0	0,0	1586,4	30,6	2436,5	47,0	1016,6	19,6	88,4	1,7
33	861,0	0,1	131,4	15,3	1,9	0,2	0,0	0,0	3,9	0,5	336,1	39,0	354,7	41,2	33,0	3,8
total:	***7325,2***	***1,2***	***146,5***	***2,0***	***42,2***	***0,6***	***1***	***0,0***	***1606,1***	***21,9***	***2988,2***	***40,8***	***2394,5***	***32,7***	***146,8***	***2,0***
FLOODPLAIN LANDSCAPES OF MOUNTAINS																
34	6246,1	1,0	–	–	293,9	4,7	18,6	0,3	1835,8	29,4	1937,9	31,0	1681,1	26,9	478,9	7,7
total:	***6246,1***	***1,0***	–	–	***293,9***	***4,7***	***18,6***	***0,3***	***1835,8***	***29,4***	***1937,9***	***31,0***	***1681,1***	***26,9***	***478,9***	***7,7***
IN TOTAL	**603549,2**	**100,0**	**2328,7**	**0,4**	**24264,0**	**4,0**	**9743,3**	**1,6**	**74962,9**	**12,4**	**93055,4**	**15,4**	**373666,9**	**61,9**	**25529,0**	**4,2**

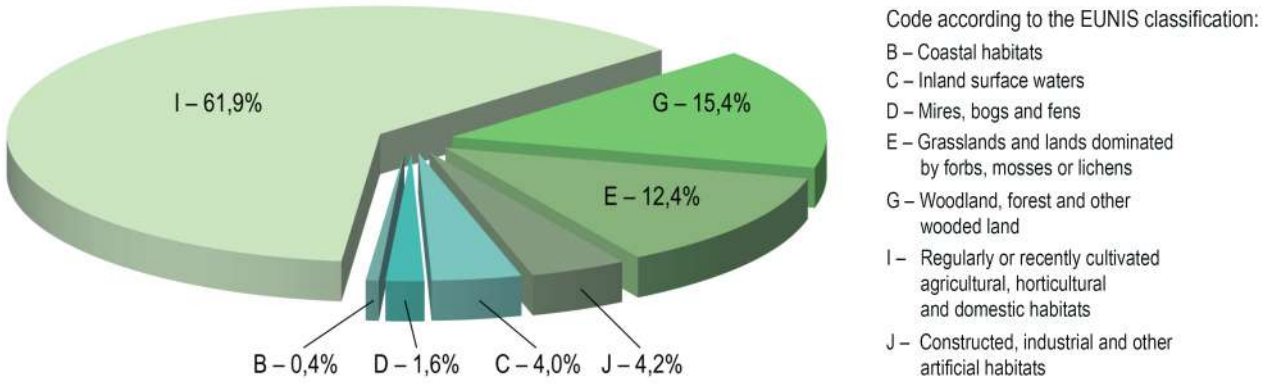

Fig. 1. The percentage of ecosystems in Ukraine (% of the total area of Ukraine)

of ecosystems at present and that this process requires a considerable amount of information, the assessment of the percentage of services provided by ecosystems was carried out with the help of the expert method. The prevailing ecosystem services were determined by experts in each of the 34 categories of landscapes (see Fig. 3) as a share of all ecosystem services.

Conclusions. 1) The concept of ecosystem services has gained importance. The ecosystem approach should be implemented in territorial management in Ukraine by 2020, and Ukrainian legislation in this area must harmonise with European legislation.

2) The classification of ecosystems in Ukraine and the ecosystem services that they provide is in the process of formation. In order to introduce the concept of ecosystem services in the sectors of the Ukrainian economy, it is necessary to scientifically substantiate, improve and generalise the conceptual and terminological apparatus, classification of ecosystems and ecosystem services, methods for assessing the condition of ecosystems and calculating the cost of ecosystem services; to develop and adopt relevant regulatory legal acts.

3) According to the EUNIS classification, there are 7 ecosystems (habitats) of the 1st level that provide basic ecosystem services in Ukraine: B – Coastal habitats (0.4% of the total area of Ukraine); C –Inland surface waters (4%); D – Mires, bogs and fens (1.6%); E – Grasslands and lands dominated by forbs, mosses or lichens (12.4%); G – Woodland, forest and other wooded land (15.4%); I – Regularly or recently cultivated agricultural, horticultural and domestic habitats (61.9%); J – Constructed, industrial and other artificial habitats (4.2%).

4) Landscapes that are in a favourable and moderately favourable environmental condition occupy about 17% of the area of Ukraine; in a satisfactory environmental condition – 49%; in a deteriorated and stressed environmental condition – 34%.

5) It is necessary to conduct a large-scale study of the components of landscape ecosystems in Ukraine for a more detailed analysis of the condition and dynamics of ecosystems, the economic assessment of ecosystems and the services they provide.

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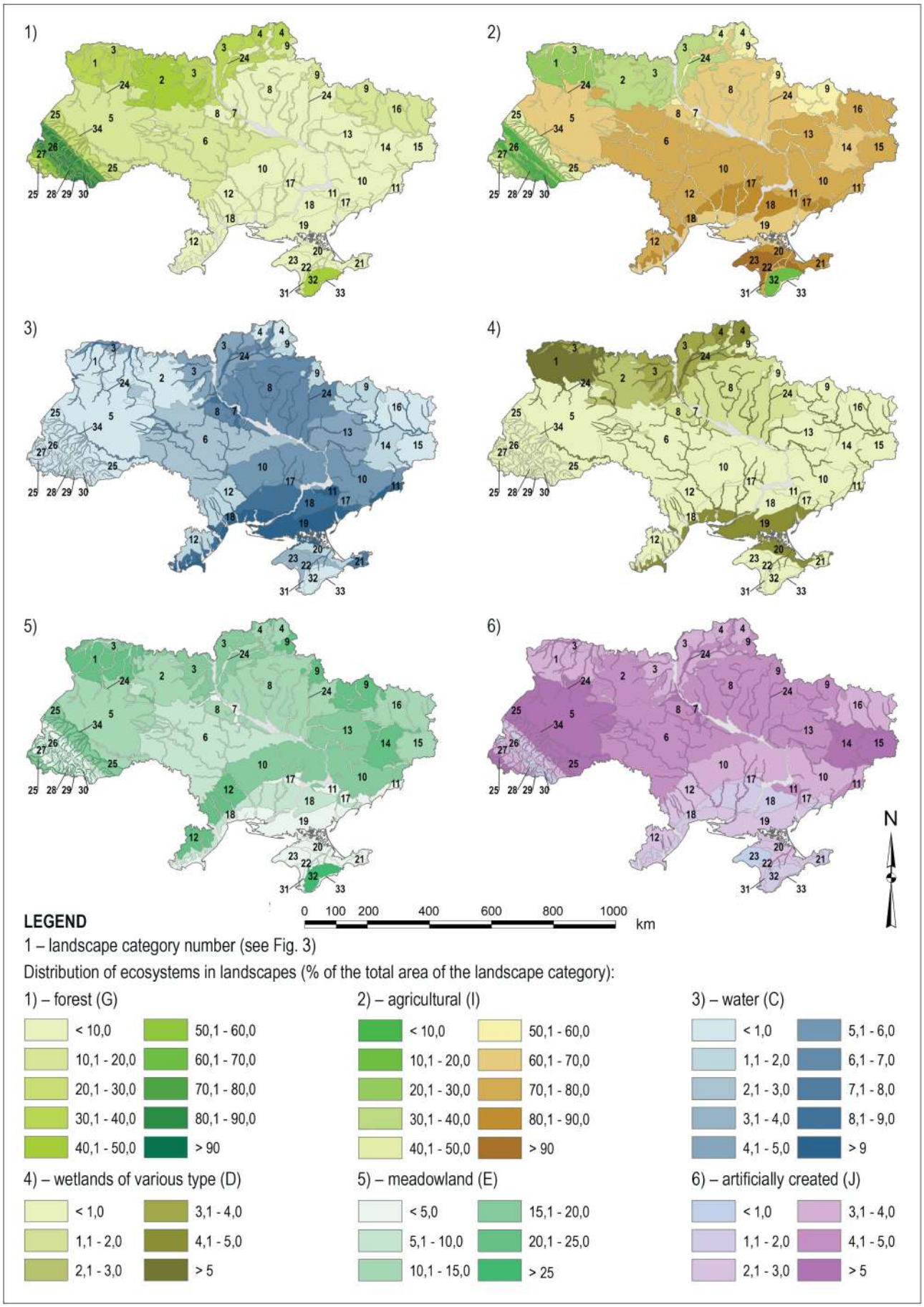

Fig. 2. The distribution of ecosystems in the landscapes of Ukraine

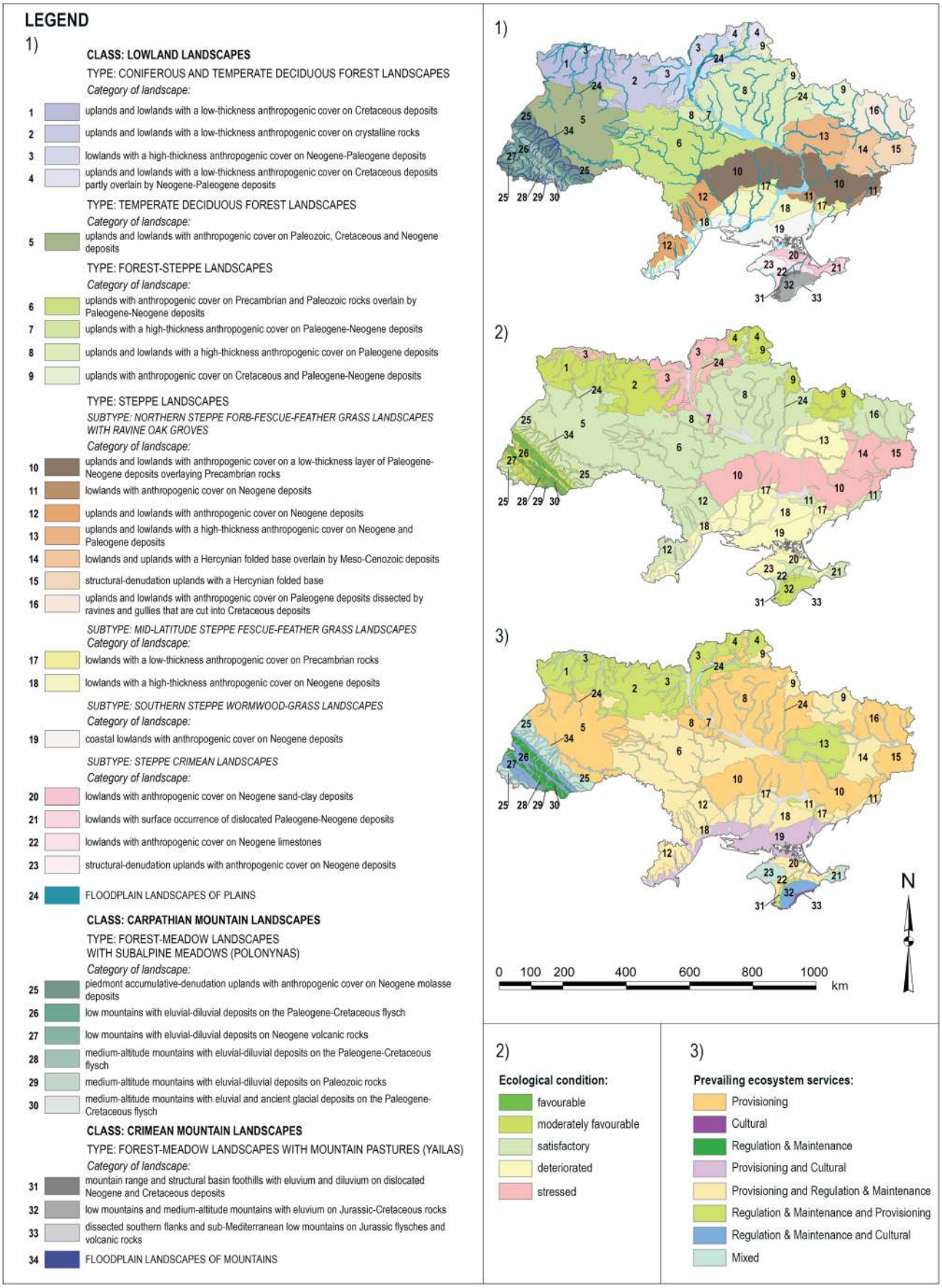

Fig. 3. 1) The landscapes of Ukraine (at the level of category of landscapes) (summarised by (Rudenko et al, 2007))
2) The ecological condition of the landscape ecosystems
3) The prevailing ecosystem services of the landscape ecosystems

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