ГЕОГРАФІЯ

https://doi.org/10.26565/2410-7360-2022-56-08
UDC 911.9+556+626/627

Received 20 December 2021
Accepted 25 December 2021

Height differentiation of valley-river landscapes of the right-bank Ukraine

Oleksandr D. Lavryk[1],
DSc (Geography), Professor, Department of Ecology and Geography,
[1]Zhytomyr Ivan Franko State University, 40 Velyka Berdychivska St., Zhytomyr, 10008, Ukraine,
e-mail: slavrik1979@gmail.com, https://orcid.org/0000-0003-2604-2500;
Volodymyr I. Korinnyi[1],
PhD (Geology), Associate Professor, Department of Ecology and Geography,
e-mail: 20oren09@gmail.com, https://orcid.org/0000-0002-1352-0940;
Leonid M. Kyryliuk[2],
PhD (Geography), Associate Professor, Department of Geography,
[2]Vinnytsia Mykhailo Kotsiubynskyi State Pedagogical University, 32 Ostrohsky St., Vinnytsia, 21100, Ukraine,
e-mail: kurulykleonid@gmail.com, https://orcid.org/0000-0001-9202-6600;
Valentyna V. Tsymbaliuk[3],
PhD (Chemistry), Associate Professor, Cycle commission of natural sciences and mathematics,
[3]Municipal Institution "Uman Taras Shevchenko Professional College of Education and Humanities of Cherkasy Regional Council", 33 Nebesnoy Sotny St., Uman, Cherkasy Region, 20301, Ukraine,
e-mail: wwala1975@gmail.com, https://orcid.org/0000-0002-2509-6956

ABSTRACT

The aim of the article. To analyze the peculiarities of height differentiation of valley-river landscapes and to study their current structure taking a model region as an example – a plain territory of the Right-bank Ukraine.

Methods. The study is based on the ideas of F. M. Milkov on anthropogenic landscapes and their vertical (height) differentiation. In the process of research the constructive-scientific landscape approach and the principles of complexity and natural-anthropogenic combination were used. The main research methods, in addition to field, are methods of theoretical generalization, historical and landscape, the leading factor, zoning, modeling, analogy and more.

Scientific novelty. The main focus of scientists is only on the impact of vertical zonation on mountain landscapes. Height differentiation of valley-river landscapes has not been given due attention. This is especially true of river valley landscapes that have been transformed as a result of economic activity.

Practical value. Previous experience in the optimization of anthropogenic landscapes shows that taking into account their height differentiation is a necessary condition for the development of various projects and schemes of environmental management. Given the growing anthropogenic pressure on the environment, such studies will help to better understand the course of negative man-made processes and contribute to the optimization, conservation and protection of modern valley and river landscapes. In the long run, this may be the basis for similar research in river valleys around the world.

Research results. The development of height differentiation within the boundaries of valley-river landscapes of the Right-bank Ukraine was considered based on the earlier experience. 2 height-landscape levels ("young" accumulative and "typical" accumulative-denudation) and 4 tiers were singled out in river valleys. Bridges, dams, causeways, derivative HES, "water" mills, anthropogenic islands, ponds of a riverbed type or meliorative canals – all these are typical for a lower tier of a "young" accumulative height-landscape level. A middle tier is represented with water-economic and agricultural landscapes. An upper tier is formed with residential and mining-industrial landscapes. In river valleys a "typical" accumulative-denudation height-landscape level has one lower tier which is formed with two natural types of localities: sloping and canyon-like. This tier is characterized with a good preservation (up to 35%) of natural landscapes. Anthropogenic landscapes are represented mainly with forest-cultural, residential, agricultural and road landscape complexes. The conclusion has been made that with further anthropogenization of river valleys it is expedient to make designs of anthropogenic landscapes, distributing them on height-landscape teirs evenly and thoughfully. Within the boundaries of a "young" accumulative height-landscape level it advisable to carry out the restoration and optimization of water-economic landscape-technical systems which are at the "aging" stage. To preserve valley-river landscapes it should be forbidden to take any economic measures except for the optimization ones.

Keywords*: height differentiation of landscapes, anthropogenic landscapes, valley-river landscapes, landscape-technical systems, river valleys.*

In cites: Lavryk O. D., Korinnyi V. I., Kyryliuk L. M., Tsymbaliuk V. V. (2022). Height differentiation of valley-river landscapes of the right-bank Ukraine. Visnyk of V. N. Karazin Kharkiv National University, series "Geology. Geography. Ecology", (56), 122-131. https://doi.org/10.26565/2410-7360-2022-56-08

Formulation of the problem. Height differentiation of landscapes is a specific phenomenon which predetermines a qualitative change of natural territorial complexes depending on the peculiarities of their relief. Contrary to mountains, serious differences of absolute and relative heights are not typical for plain landscapes. Nevertheless, in the plain territories height differentiation of landscapes is clearly expressed in the peculiarities of the structure and dynamics of geo-complexes of a various taxonomic level. It can be clearly observed in river valleys of the Right-bank Ukraine. Height differentiation defines numerous important natural features of valley-river landscapes: it increases their diversity, speeds up or slows down the movement intensity of substance flows, energy and information, changes the productivity and development of landscape complexes. The essential anthropogenization of present-day river valleys and the concentration of landscape-technical systems (LTchS) within their boundaries require the consideration of the specificity of this phenomenon. As quite frequently the intensive economic effect on height-landscape levels of valley-river landscapes results in the development of negative processes (waterlogging, salinity, landslides, etc.), serious capital investments are needed to overcome them.

Analysis of the latest research and publications. Till the second half of XX century mainly the representatives of geomorphology, climatology and biology dealt with the problems of vertical differentiation of geocomplexes. For the first time the issue of vertical differentiation of landscapes appeared to be interesting for a geographer from Voronezh F. M. Milkov (1947) [14], who paid attention to the dependence of intra-zonal changes of plain landscapes on the differences of absolute heights. However, in the context of studying plain landscapes his interpretation of a concept "vertical" (from Latin *verticalis* – upright) was poor because of its very narrow meaning. Which is why, a more general term – "*height differentiation*" is used in Ukrainian landscape literature. Later on, F. M. Milkov (1953) [13] explained the effect of a relief on the peculiarities of the biodiversity of river valleys. So, he thought that in a glaciation period deciduous forests of Volyn-Podilsk height and Donetsk ridge were preserved under the protection of steep right valley-river slopes. Within plain landscapes of a middle-russian forest-steppe a phenomenon of vertical (height) differentiation was considered by H. O. Beloselska (1969) [2], O. V. Berezhnoi (1983) [3], V. B. Mikhno (2001) [16], A. S. Horbunov (2002; 2020) [6; 19], S. V. Fedotov (2009) [17; 18], N. I. Akhtyrtseva (2004) [1] analyzed a tier nature of plain landscapes, having taken Kalachska height as an example, and classified four landscape tiers: flood, over-flood-terrace and watershed. The research of height differentiation of natural landscapes of Ukraine and its regions was carried out by H. I. Denysyk (2006; 2010) [4; 7], L. M. Kyryliuk (2007) [11] and I. M. Voina (2010) [5]. Some aspects of the anthropogenic effect on plain landscapes of Podillia were studied by the authors (2014, 2016) [10; 12].

Separation of the unsolved part of the whole problem. Similar studies are not available in foreign geography. Researchers pay their main attention only to the effect of vertical tiers on mountainous landscapes [20–23]. The analytical review of the recent local works on landscapes helps make a conclusion that most of them contain the studies of vertical and horizontal, very seldom time differentiation of valley-river landscape complexes and geocomponents. Proper attention is not paid to height differentiation of valley-river landscapes. It mostly concerns the landscapes of river valleys transformed as a result of economic activity. Alongside with this, an earlier experience of the optimization of anthropogenic landscapes shows the importance of height differentiation as a required condition for the development of various projects and shemes of rational nature use.

Goal formulation of the paper. To analyze the peculiarities of height differentiation of valley-river landscapes and to study their current structure taking a model region as an example – a plain territory of the Right-bank Ukraine.

Presentation of the major research material. The Right-bank Ukraine is one of the regions of the oldest human settlement in East Europe. This is due to natural conditions, in particular plain character and mild climate. Consequently, people began to actively influence the environment, to drastically change it from upper paleolith (40–35 thousand years ago). In the second half of XIX century the influence was so powerful that anthropogenic landscapes beagn to predominate.

Nowadays the landscapes of plain rivers of the Right-bank Ukraine are characterized by the combination of natural and anthropogenic landscape complexes. The extent of their anthropogenization is significant – landscape-technical systems transformed river valleys by 85 %. Two height-landscape levels are singled out within the boundaries of river valleys ("young" accumulative and "typical" accumulative-denudation) and 4 tiers (Table 1). A concrete natural type of locality and certain tracts correspond to each natural height-landscape level. Accordingly, their types of localities and valley-river landscape-technical systems are typical for the anthropogenic height-landscape levels.

Regional peculiarities of height-differentiation of anthropogenic valley-river landscapes are determined mostly by natural conditions and the structure of landscape complexes of height-landscape levels and tiers as well as by the nature of their economic

Table 1

Height-landscape levels within river valleys of the Right-bank Ukraine

Natural valley-river landscapes					
Height-landscape levels	**Tiers**	**Natural valley-river landscapes**		**Anthropogenic valley-river landscapes**	
		Locality types	**Background tracts**	**Locality types**	**LTchS**
«Young» accumulative	Lower	Riverbed	Central channels; shallow channels (arms); threshold, natural islands; removal cones; central deep waters; coasal shelfs	Riverbed-canal	Bridges; dams; causeways; derivative HES; mills; canals; fountains
				Riverbed-pond	Riverbed ponds; anthropogenic islands; mills
	Middle	Flood	Dead channels; lower swamps; willow-alder forests; weed meadows	Flood-pond	Flood ponds; ponds; settling tanks; mills
				Flood-water reservoir	HES; water reservoirs
	Upper	Above-flood-terrace	Oak-tree, oak-pine tree, pine-tree forests; weed meadows; reed-cattail and weed swamps; ravines; gullies	Terrace-residential	Settlements; roads
				Terrace-agricultural	Irrigation and drainage fields; greenhouses; orchards on anchored terraces
				Terrace-mine-damps	Mines; damps
«Typical» accumulative-denudation	Lower	Sloping	Oak-tree, beech-tree, beech-oak-tree forests; steppe meadows; ravines; gullies	Sloping-residential	Settlements; roads
				Sloping-agricultural	Irrigation and drainage field systems; greenhouses; orchards on anchored terraces
				Sloping-mine-damps	Mines; damps of wastes
		Canyon-like	Oak-tree forests; steppe meadows; ravines; gullies; “wall” tracts	Canyon-water reservoirs	Water reservoirs

use/development.

Peculiarities of height-differentiation of anthropogenic valley-river landscapes of a “young” accumulative height-landscape level. Anthropogenic landscape complexes within a “young” accumulative height-landscape level are spread evenly.

Water-economic LTchS, situated within channels, are typical *for a lower tier of a “young” accumulative height-landscape level:* bridges, dams, causeways, derivative HES, “water” mills, anthropogenic islands or ponds of a riverbed type. Their specificity consists in the constant direct contact with water masses, having a foundation under the water cut. At present most of these systems do not perform their ecnomic functions and they are at the stage of “destruction” (“aging”). In most cases channels and floods, not occupied by ponds and water reservoirs, are presented with ameliorative rectilinear canals. This is particularly typical for the valleys of the right tributary of the Dnipro river within Ukrainian Polissia (Fig. 1). In the forest-field territory canals are mostly used as floods of small rivers. Due to the fact that planned cleanings of these canals are not done, gradually riverbeds get some characteristic features,

namely: canals get silted, slopes become steeper, meandring (bending) continues in many places, even small islands, straits can be seen. Vegetation recovers. Gradually canal slopes get sodded and waterlogged. As to woody vegetation, various species of willow and alder appear, one can see aspen-trees, white poplar trees (*Populus alba*). Dog-roses and wild-steppe cherry-trees (antypka) are not typical plants for these tracts.

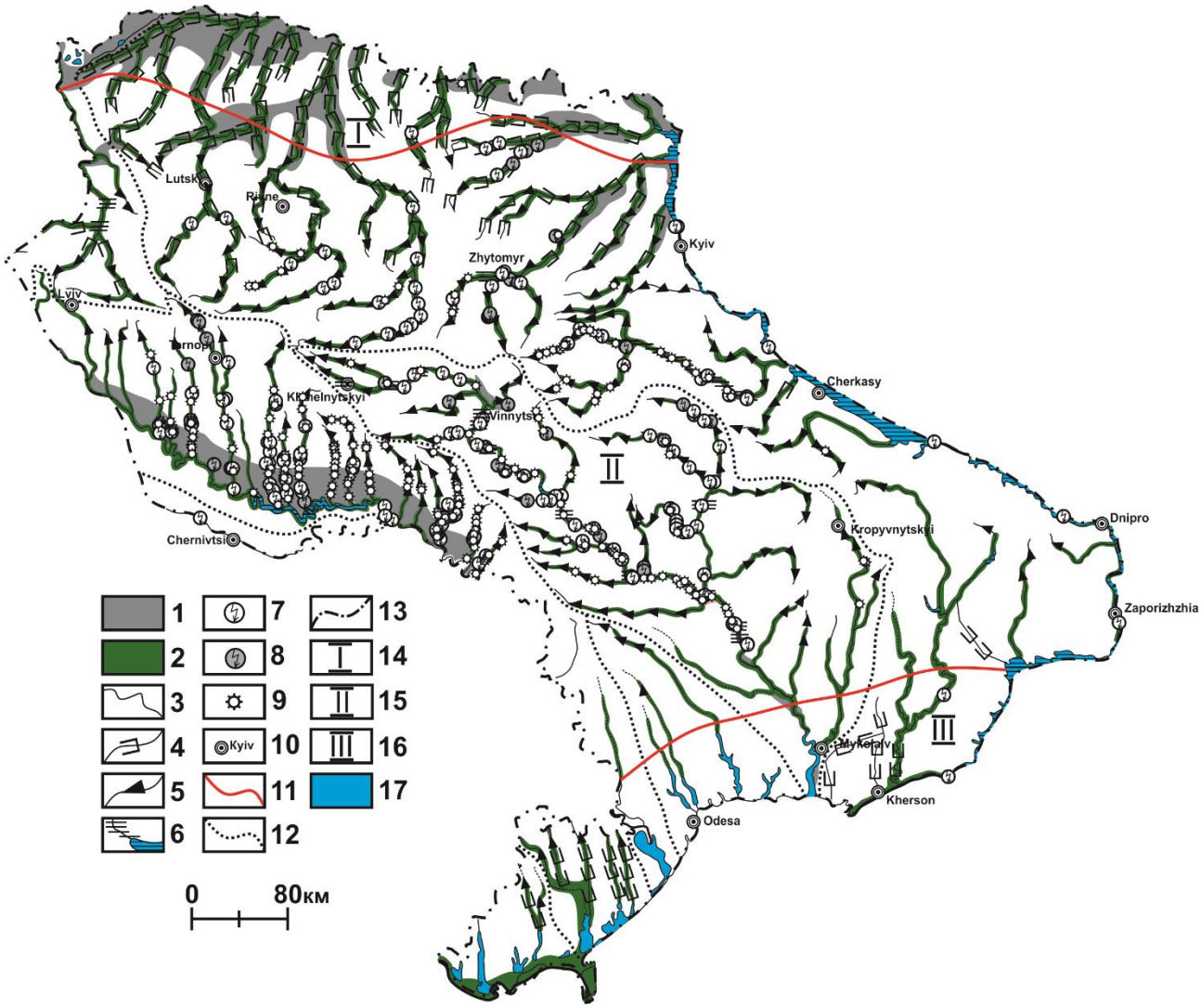

Fig. 1. Association of landscape-technical systems with the height-landscape levels of the river valleys of the Right-bank Ukraine.

Height-landscape levels: 1 – «young» accumulative; 2 – «typical» accumulative-denudation. **Natural landscapes. River landscapes of the plains**: 3 – channels, formed by aqual plots of rifts and tracts. **Anthropogenic landscapes. Landscape-technical systems. Water-economic**: 4 – landscape-technicalcanal systems; 5 – pond LTchS; 6 – water reservoir LTchS; 7 – hydro-power LES; 8 – hydro-power LES; 9 – mill LTS. **Residential**: 10 – city LTchS (administrative centers). **Boundaries: Landscape**: 11 – anthropogenic zones. **Pool**: 12 – watersheds. **Conditional**: 13 – region under research. **Other symbols**: 14 – forest pasture; 15 – forest-field; 16 – field; 17 – lakes and large lakes (gulfs)

A middle tier of a "young" accumulative height-landscape level is represented with flood-water reservoir and flood-pont types of the localities. Water reservoirs are common in the valleys of the Southern Buh, a trubutary to the Dnipro and the Dnister in the forest-field territory of the Right-bankUkraine. Mainly they are water-economic LTchS resulted from the construction of dams, "water" mills, hydro-electirc stations. Most of the ponds and water reservoirs were created in 1950-60ties, which is why the "aging" stage is quite typical for them now. The processes of eutrophication are rather active at this stage. Water reservoirs get silted and covered with water-swamp vegitation. Sedge-reed-cattail associations dominated in the projective covering. The process of pond siltation takes 8-12 years in the forest-field and field zones [15]. A new outlier-pond-flood type of the localities is formed within the boundaries

of a transformed channel and flood. Some animal populations which require water on a constant basis disappear (fish, frogs, tritons/newt). At the beginning of XXI century the number of such dam LTchS increased considerably in the valleys of the rivers of the forest-field area of the Right-bank Ukraine.

Near-Dnister and Podillia water reservoirs are singled out within the middle tier. Water reservoirs of Prydnistrovia are associated with the lowest marks in the relief (from 50 to 200 m). All these water reservoirs have a serious length (tens of meters) and depths. For instance, the length of the largest Dnister water reservoir in Podillia is equal to 196 km, its width ranges from 400 to 660 m [9]. Background facies here are deep places/tracts. Facies of cattail-reed and sedge swamps are very rare in the coastal area of water reservoirs. The areas of swamps increase considerably only in the upper parts of water reservoirs, there they change into riverbeds. Water reservoirs of Podillia type have other characteristics. The length of these water reservoirs seldom exceeds 10 km, their width ranges from 1 to 2-3 km. Ternopilske, Shchedrivske water reservoirs in Khmelnytsk region and Mykulynetske water reservoir in Vinnytsia region can be the example. Almost all water reservoirs of Podillia type are shallow (the largest depth seldom exceeds 5-6 m). Consequently, in addition to facies of deep places, facies of cattail, reed, cattail-reed and sedge swamps are rather common here. They cover 25-30 % of the total area on some water reservoirs.

Ponds of a flood type are not deep (seldom up to 3-4 m) and their areas amount to 50-100 ha. The characteristic feature of these ponds is their fast siltation and overgrowth. If these ponds are not used for intensive fish farming or they are not part of a poultry farm which specializes in waterfowling, they become lowland swamps in a very short period of time (about 7-10 years). Background facies on these ponds are cattail-reed and sedge swamps, clean deep places/tracts can be seen very seldom here. The latter covers 70-75 % of the area on the ponds which are used intensively. Cattail-reed swamps which cover about 20-25 % are also typical for them. Transitive facies are represented by sedge and calamus swamps. Different species of willow, black alder (*Alnus glutinosa*), aspen *Populus tremula*) are to be mentioned among other vegetation of transitive swamps, as to grassy vegetation – slender sedge (*Carex acuta*) and marsh iris (*Iris pceudacrus*).

Fauna of the ponds is very much diversified. The following fish is mainly bred: carp, crucian, silver carp. Quite frequently one can see pike, perch, ctenopharyngdon, dace/roach, eel. The world of birds is rich and diversified. There are swans, wild ducks and geese, water bull, various species of gulls, sandpipers, reed warblers. Tract and swamp facies are a favorable place of hunting for grey heron, white and balck storks. Marsh turtle, beavers and water rats are quite common among otheranimals, their area widens with every coming year.

Cultured pastures predominate among anthropogenic landscape flood complexes. In the second half of XX century after extended drainage of floods (particularly in the territory of Volyn, Zhytomyr and Kyiv Polissia), the bottoms of river valleys were plowed deeply (up to 50 cm) and agricultural crops were sown there. Annually these areas required the application of mineral fertilizers and the regular sowing of more grasses which in turn increased financial expenses of the farm businesses. Gradually people gave up taking these measures, and flood meadows began to develop naturally (by natural principles). Some of them were used for haymaking; others became the pastures for public livestock. The following plants predominate here: hemphurds (*Festuca ruba*), blue grass (*Poa pratensis*), upright and creeping tormentil (*Potentilla erecta, P. reptans*), various species of sedges, water and roof avens (*Geum rivale, G. urbanum*). Facies of reed and cattail-calamus swamps are quite common in lowlands.

Flora in flood meadows transformed into pastures is somewhat different. Due to the effect of intensive livestock pasturing such plants dominate here, namely, creeping couch grass, knotweed (*Polygonum aviculare*), blue grass, different weeds (mostly nettle (*Urtica diolica*) and various species of thistle). Tarragon (*Artemisia vulgaris*), sheep fescue are quite common in the southernregions of Podillia. In most cases flood tracts of a meadow-pasture type are cut with numerous canals. They are linear prolonged waterlogged lowlands with such species of grass as reed, cattail (*Tupha latifolia),* whereas slender sedge, water mannagrass (*Glyceria maxima*) and also swamp willows (*Calix pentandra*) are rare here.

In addition to the mentioned anthropogenic complexes in the middle tier of a “young” accumulative height-landscape level, there are other anthropogenic complexes: vegetable gardens, dacha plots, orchards, sometimes – sport complexes.

Within the boundaries of residential landscapes, floods are used as cultured haymaking areas as well as vegetable gardens. The tracts of private cultured haymaking areas are characterized with rather high productivity as every year fescue grass, ryegrass, alfalfa and clover are sown, mineral and organic fertilizers are applied. Re-plowing of these soils take place with time intervals (usually once in a 10-15 years).

The tracts of vegetable gardens are not very common. Mostly they are used for growing vegetable crops (first of all, early cabbage, radish, tomatoes, onions, peppers). Such vegetable gardens are typically frequent in the southern part of Podillia.

At the end of the 1980ties – at the beginning of

the 1990ties the formation of new anthropogenic landscape complexes began atively in the areas of dacha construction. Their characteristic feature is the small-size plots where dwelling houses, orchards and vegetable gardens are situated. These plots are very popular near big cities of the Right-bank Ukraine – Vinnytsia, Khmelnytskyi, Ternopil, Zhytomyr, Rivne, Lutsk and others.

The plots of natural forests of an above-flood-terrace type were preserved within *the upper tier of a "young" accumulative height-landscape level,* particularly in the north of the Right-bank Ukraine and in Middle Pobuzhia (forest-steppe polissia) [8].

In the forest-field of the Right-bank Ukraine steppe and forest plots of above-flood terraces were destroyed long ago. These are very old territories which are inhabited by people and have agricultural developments. Field and meadow-pasture types of agricultural landscapes predominate here; residential landscapes are rather typical for them.

Field agricultural landscapes associated with above-flood terraces are characterized with anual cultivation, the application of organic and mineral fertilizers to maintain porper soil fertility. Specific plant groupings are formed here. Wheat, barley, sugar beets predominate among agricultural crops; small plots are under potatoes and vegetable crops. Consequently, each plant cultivar has its certain weeds, and corresponding zoocenoses are formed.

Meadow-pasture landscapes of obove-flood terraces are represented mostly by cultured meadows which occupy 15-20 % of the terrace territory. In most cases these meadows are used to sow perennial grasses (fescue grass, clover, alfalfa) which grow for 3-5 years at the same place. These plant groupings are a good home-place for larks and partridges, hares and foxes spend a greater part of the year here.

Among other anthropogenic landscape complexes, residential landscapes occupy 5-7 % of the area on the above-flood-terrace localities. Large areas are a characteristic feature of the agricultural settlements of these localities. Villages are well-planned, but they have different configuration. The latter depends on the basin form of the main river which flows through a settlement as well as on the number of tributaries (small rivers, creeks) which run into it. Vegetable gardens which cover about 60 % of private plots are situated mostly on the leveled terrace areas. Orchards with dwelling houses and business facilities are situated on the terrace ridges. The soils in these settlements differ, but they are typically poor in humus because of the cultivation of the same crops. Both natural and cultured vegetation represent flora in rural residential landscapes of avove-flood-terrace localities.

City settlements are associated with above-flood-terracelocalities (Fig. 2). Although they occupy smaller areas in comparison with villages, the extent of the transformation of natural landscapes is much higher. The relief undergoes levelling in the first place. Hills are cut, ravines and gullies are covered, terraces are cut on steep slopes. Later, dwelling

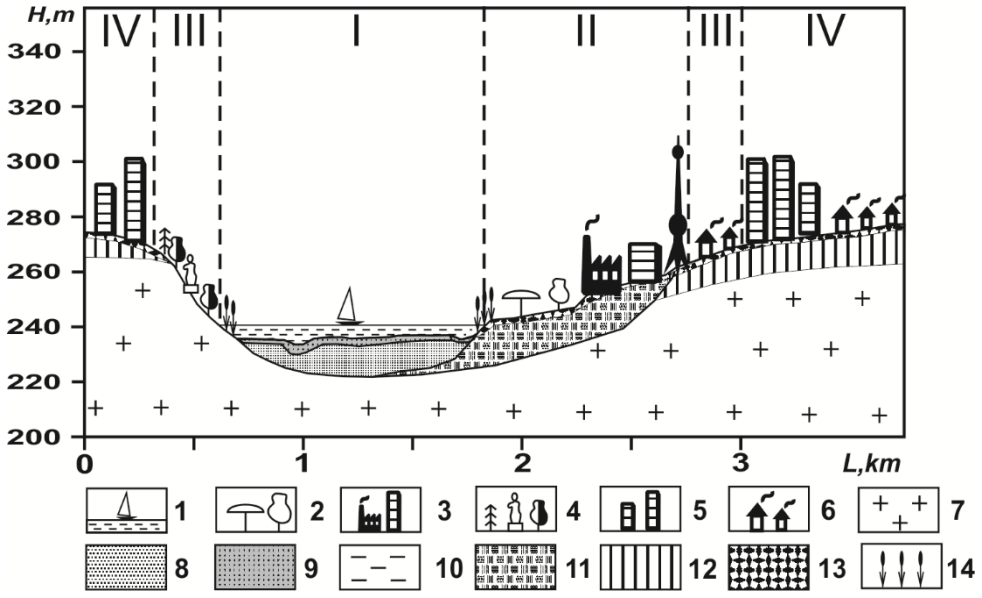

Fig. 2. Scheme of height differentiation of city landscapes within a "young" accumulative height-landscape level of Podillia.

Residential landscapes. City: 1 – water-economic-residential; 2 – recreation; 3 – industrial-residential; 4 – orchard-park; 5 – multy-storey; 6 – low-rise.

Landscape profile: 7 – pre-cambrian rocks; 8 – alluvial sand of flood; 9 – silt deposits; 10 – water mass; 11 – fluvioglacial sand and clay sand; 12 – loess; 13 – grey forest soils; 14 – water-swamp vegetation.

Locality types. Anthropogenic: I – flood-water-reservoir; II – terrace-residential; III – sloping-residential; IV – flat-residential

houses and industrial premises are built on these territories. The area among them is asphalted. As a result, soils, natural vegetation and fauna have been totally killed.

Road and industrial landscape complexes are singled out among other anthropogenic landscape complexes which can be seen in the upper tier of a "young" accumulative height-landscape level. Road landscapes are represented by highways and railways of a different purpose. They are created on artificial embankments at long distances and have a complicated landscape structure. The trees of trembling poplar, heart-shaped linden and brittle willow are planted in the roadside protection strips. Other species of trees are seldom planted here.

Mining-industrial landscapes within the upper tier are mostly represented by quarries. The largest quarries are the following: Hnivan-Vitavskyi granite mine – 1250 ha, Zavallia graphite mine – 200 ha, Ladyzhyn sand mine – 180 ha (the valley of the Southern Buh river); Hlukhovets kaoline mine – 156 ha (the valley of the Kaolinova river); Polonsk granite mine – 140 ha (the valley of the Homora river); Korosten granite mine – 94 ha (the valley of the Uzh river); Pyniazevets granite mine – 61 ha (the valley of the Irsha river); Zhezheliv granite mine – 54 ha (the valley of the Hnylopiat river; and others.

Within the boundaries of the river valleys *a "typical" accumulative-denudation height-landscape level has one lower tier* formed with two natural types of the localities: sloping and canyon-like. Natural valley-river landscapes are preserved comparatively well on this tier (up to 35 %).

Sloping and canyon-like localities are characterized by the largest forestation within the forest-field of the Right-bank Ukraine. Natural forest landscapes occupy 22-28 % of the territory. The rest of the forests are either derivative or silvicultural. Derivative forest landscapes were formed at the places where deforestation was done in the past. Dominating species in the forests of Podillia were oak- and beech-trees. After mass deforestation, the areas were planted with hornbeam trees, aspen- and birch-trees were planted on the lower land. Oak-trees were also planted, but it was not the main species any longer. Consequently, 45 % of present-day forests of Podillia are derivative oak-hornbeam forests and in the west they are beech-hornbeam forests.

Silvicultural landscape complexes are associated with these localities. As steep slopes are more erosion dangerous, they are planted with forest crops in the first place. Oak-trees (60 %) and pine-trees (20-25 %) predominate in the tree plantations. The other species planted in the tree plantations are beech, spruce, hornbeam, and rarely – ash- and linden-trees. At the beginning of XXI century silvicultural landscapes occupy 42-46 % of all the forests of the Right-bank Ukraine. Chaotic forestation took place, and it depended on the availability of planting material.

Residential landscapes are very common on sloping and canyon-like localities. Settlements on sloping localities are more typical in Prydnistrovia and in Middle Pobuzhia. The villages here are situated along rivers and gullies. Merging together they form rural agglomerations which stretch for dozen of kilometers. Malostruzhkivska-Lypchanska agglomeration is the largest among them – 57 km: it begins in Khmelnytsk region and ends in Vinnytsia region.

Lithogenic basis in the settlements of sloping localities underwent drastical changes. Slopes here are terraced; ledges are strengthened with artificial walls. Landscape complexes are well differentiated by the heights. Vegetable gardens are situated in the lower part of the slopes on the passageway to the floods or on the floods themselves. Orchards and buildings occupy the main part of the slopes. Stone fruits (cherries, sweet cherries, apricots, seldom - peaches) dominate in the orchards. There are many apple-, pear-, walnut-trees. The area of vineyards increases all the time. Livestock farms, auto- and tractor-fleets as well as a part of the towns are situated in a transition lane to flat areas (plakors). Natural vegetation is well preserved on sloping localities in the settlements. It grows in deep ravines and gullies which in fact are in every village and town.

Road landscapes on this tier are represented exclusively by local and regional highways. They all run along the slopes in the form of a serpentine which makes them look like mountainous ones. There is no woody vegetation on one side of this road, on the other side there are walls – 1.5-2 m high – with shrubs and trees above them. Acacia- and maple-trees predominate among trees; lilac takes a central place among bushes. The basis of these roads is local mountain rocks which result from terracing or they are brought from near-by quarries.

Orchard agricultural landscapes are very popular on sloping localities. Orchards are very similar to silvicultural landscapes. They differ from them by a less-expressed self-regulation and a largesr effect of an anthropogenic factor. Every year pruning is done, inter-rows are plowed, grain crops are sown and early vegetables are grown in the orchards.

The rest of the territory of sloping localities and a greater part of canyon-like localities is under meadows and pasture. Pasturing predominates. There is almost no haymaking. A peculiar feature of the pastures in these localities is the fact that they appeared on natural meadow-steppe plots or on the degraded forest tracts due to excessive livestock pasturing. Sheep fescue, low-rise sedge, slender koeleria (*Koeleria gracilis*) predominate among grass plants. Rare and endemic species are seldom found among this vegetation. Pastures on the slopes are "laced" with terra-

ces which have clearly-seen paths for livestock to walk but they have no vegetation. In the mid-summer these pastures change into wasteland.

Industrial landscapes are typical for the slopes of river valleys. They are represented mostly by small quarries. Local residents use opened rocks of the quarries for the construction and to fill up roads. Some of them are placed as small slagheaps on the floods and later they are covered with ruderal vegetation. They are mainly various tarragon species and blue grass. As to bush and woody vegetation, swamp willow and acacia are quite common in the southern areas, whereas birch-trees are found in the central and northern areas. Quarry slopes form almost upright/vertical (up to 60-80 m) and sometimes terraced "walls".

Water anthropogenic landscapes are found in the lower tier of a "typical" accumulative-denudation height-landscape level. These are ponds which are attached to the slopes. Their active construction has been carried out during the last 25-30 years. The ponds occupy small areas and they are rather deep, their depth near dams amount to 7-12 m. Due to their young age, the ponds experience a serious effect of accumulative-denudation processes: bank erosion, the formation of a removal cone; all this leads to their siltation. Swamp groupings appear in the upper parts of these ponds 5-8 years later (after they were created). Cascades/waterfalls of the ponds in the gullies were created in some villages (Yablunivka in Khmelnytsk region, Rashtivtsiin Ternopil region).

Conclusions. The analysis of height differentiation of the landscapes of the river valleys has just been started. Taking into account the increasing anthropogenic pressure on the environment, such examinations will help understand better the course of negative techno-genic processes and they will facilitate the optimization, preservation and protection of current valley-river landscapes. In perspective it can become the grounds to carry out similar research in the river valleys of the whole planet.

With further anthropogenization of the river valleys, it is expedient to carry out the designing of anthropogenic landscapes distributing them thoughtfully and evenly on height-landscape tiers. Thus, within a "young" accumulative height-landscape level, it is advisable to do the restoration and optimization of water-economic LTchS which are at the "aging" stage. In the future landscapes are subject to total nature reservation along the valley. To preserve valley-river landscapes, it is required to forbid any economic measures except for optimization ones. The formation of new anthropogenic landscapes is to be associated with the tiers of upper height-landscape levels. Alongside with this, the areas of the valley natural landscapes have to be preserved as much as possible.

Bibliography

1. *Ахтырцева Н. И. Вертикальная структура и вопросы эволюции ландшафтных комплексов Калачской возвышенности / Н. И. Ахтырцева // Вестник Воронежского государственного университета. Серия : География и геоэкология. – 2004. – № 1. – С. 57–61.*
2. *Белосельская Г. А. Основные вопросы вертикальной дифференциации ландшафтов центральной лесостепи / Г. А. Белосельская // Вопросы ландшафтной географии. – Воронеж, 1969. – С. 16–24.*
3. *Бережной А. В. Склоновая микрозональность ландшафтов среднерусской лесостепи : монография / А. В. Бережной. – Воронеж : Изд-во Воронеж. ун-та, 1983. – 137 с.*
4. *Висотна диференціація рівнинних ландшафтів / Г. І. Денисик, Л. М. Кирилюк, О. П. Чиж, І. М. Война // Наукові записки Вінницького державного педагогічного університету імені Михайла Коцюбинського. Серія : Географія. – 2006. – Вип. 1. – С. 5–11.*
5. *Война І. М. Висотна диференціація та різноманіття антропогенних ландшафтів (на прикладі Вінницької області) : автореф. дис. на здобуття наук. ступеня канд. геогр. наук : спец. 11.00.11 «Констр. географія і рац. використ. прир. ресурсів» / І. М. Война. – Чернівці, 2010. – 20 с.*
6. *Горбунов А. С. Вертикальная дифференциация ландшафтов лесостепной зоны мелового юга Среднерусской возвышенности : автореф. дис. на соискание учен. степени канд. геогр. наук : спец. 25.00.23 «Физ. география и биогеография, география почв и геохимия ландшафтов» / А. С. Горбунов. – Воронеж, 2002. – 22 с.*
7. *Денисик Г. І. Висотна диференціація рівнинних ландшафтів України : монографія / Г. І. Денисик, Л. М. Кирилюк. – Вінниця : ПП «ТД «Едельвейс і К», 2010. – 236 с.*
8. *Денисик Г. І. Лісостепові Полісся / Г. І. Денисик, О. П. Чиж. – Вінниця : Теза, 2007. – 210 с.*
9. *Денисик Г. І. Природнича географія Поділля / Денисик Г. І. – Вінниця : ЕкоБізнесЦентр, 2006. – 184 с.*
10. *Кирилюк Л. Висотна диференціація сучасних ландшафтів Полонського району / Л. Кирилюк, В. Корінний, Ю. Кравець // Вісник Львівського університету. Серія географічна. – 2014. – Вип. 48. – С. 95–99.*
11. *Кирилюк Л. М. Висотна диференціація ландшафтів Поділля : автореф. дис. на здобуття наук. ступеня канд. геогр. наук : спец. 11.00.01 «Фізична географія, геофізика і геохімія ландшафтів» / Л. М. Кирилюк. – Львів, 2007. – 20 с.*
12. *Лаврик О. Д. Висотна диференціація долинно-річкових ландшафтно-технічних систем / О. Д. Лаврик // Наукові записки Вінницького державного педагогічного університету імені Михайла Коцюбинського. Серія : Географія. – 2016. – Вип. 28, № 3–4. – С. 18–26.*
13. *Мильков Ф. Н. Воздействие рельефа на растительность и животный мир (Биогеоморфологические очерки) /*

Мильков Ф. Н. – М. : Географгиз, 1953. – 164 с.
14. *Мильков Ф. Н. О явлении вертикальной дифференциации ландшафтов на Русской равнине / Ф. М. Мильков // Вопросы географии. – 1947. – № 3. – С. 87–102.*
15. *Мильков Ф. Н. Человек и ландшафты. Очерки антропогенного ландшафтоведения. – М. : Мысль, 1973. – 224 с.*
16. *Михно В. Б. Высотно-ландшафтные комплексы мелового юга Среднерусской возвышенности / В. Б. Михно, А. С. Горбунов // Вестник Воронежского государственного университета. Серия : География. Геоэкология. – 2001. – №1. – С. 16–24.*
17. *Федотов С. В. Вертикальная дифференциация литогенных ландшафтов равнин и вопросы их оптимизации в бассейне Средней Десны / С. В. Федотов // Проблемы региональной экологии. – 2009. – № 6. – С. 25–29.*
18. *Федотов С. В. Поверхности выравнивания и проблема вертикальной дифференциации литогенных ландшафтов центра Русской равнины / С. В. Федотов // Вестник Воронежского государственного университета. Серия : География. Геоэкология. – 2009. – № 2. – С. 101–106.*
19. *Altitudinal Landscape Complexes of the Central Russian Forest–Steppe / A. S. Gorbunov, V. B. Mikhno, O. P. Bykovskaya, V. N. Bevz // Landscape Patterns in a Range of Spatio-Temporal Scales / A. V. Khoroshev, K. N. Dyakonov (Eds.). – Cham : Springer Nature Switzerland AG, 2020. – P. 207–220. https://doi.org/10.1007/978-3-030-31185-8.*
20. *Bu X. Effect of Landform on Landscape Pattern Vertical Differentiation in Rapidly Urbanized Shenzhen City / X. Bu, Y. Wang, J. Wu // Acta Geographica Sinica. – 2008. – Vol. 63, Is. 1. – P. 75–82. http://www.geog.com.cn/CN/10.11821/xb200801008.*
21. *Stadel C. Horizontal and Vertical Archipelagoes of Agriculture and Rural Development in the Andean Realm / C. Stadel // Sustainable Rural Development. – 2019. – P. 1–21. http://dx.doi.org/10.5772/intechopen.86841.*
22. *Vertical Zonation of Landscape Characteristics in the Namjagbarwa Massif of Tibet, China / Peng Buzhuo, Pu Lijie, Bao Haosheng, D. L. Higgitt // Mountain Research and Development. – 1997. – Vol. 17, No. 1. – P. 43–48. https://doi.org/10.2307/3673912.*
23. *Vertical zonation of mountain landscape: a review / Ran-Hao Sun, Li-Ding Chen, Bai-Ping Zhang, Bo-Jie Fu // Ying Yong Sheng Tai Xue Bao. – 2009. Vol. 20, Is. 7. – P. 1617–1624.*

Authors Contribution: All authors have contributed equally to this work

References

1. *Akhtyrtseva, N. I. (2004). Vertical structure and issues of evolution of landscape complexes of the Kalach Upland. Bulletin of Voronezh State University. Series: Geography and Geoecology, 1, 57–61 [in Russian].*
2. *Beloselskaya, G. A. (1969). Main issues of vertical differentiation of landscapes of the central forest-steppe. Questions of of landscape geography, 16–24 [in Russian].*
3. *Berezhnoy, A. V. (1983). Slope microzonality of landscapes of the Central Russian forest-steppe. Voronezh, 137 [in Russian].*
4. *Denysyk, G. I., Kyrylyk, L. M., Chyzh, O. P., Voina, I. M. (2006). High-altitude differentiation of plain landscapes. Scientific notes of Vinnytsia State Pedagogical University named after Mykhailo Kotsyubynsky. Series: Geography, 1, 5–11 [in Ukrainian].*
5. *Voina, I. M. (2010). High-altitude differentiation and diversity of anthropogenic landscapes (on the example of Vinnytsia region). Extended abstract of candidate's thesis. Chernivtsi [in Ukrainian].*
6. *Gorbunov, A. S. (2002). Vertical differentiation of landscapes of the forest-steppe zone of the Cretaceous south of the Central Russian Upland. Extended abstract of candidate's thesis. Voronezh [in Russian].*
7. *Denysyk, G. I., Kyrylyk, L. M. (2010). High-altitude differentiation of plain landscapes of Ukraine. Vinnytsia, 236 [in Ukrainian].*
8. *Denysyk, G. I., Chyzh, O. P. (2007). Forest-steppe Polissya. Vinnytsia, 210. [in Ukrainian].*
9. *Denysyk, G. I. (2006). Natural geography of Podillya. Vinnytsia, 184 [in Ukrainian].*
10. *Kyrylyk, L., Korinnyi, V., Kravets, Yu. (2014). High-altitude differentiation of modern landscapes of Polonsky district. Visnyk of Lviv National University. The series is geographical, 48, 95–99 [in Ukrainian].*
11. *Kyrylyk, L. M. (2007). High-altitude differentiation of Podillya landscapes. Extended abstract of candidate's thesis. Lviv [in Ukrainian].*
12. *Lavryk, O. D. (2016). High-altitude differentiation of valley-river landscape-technical systems. Scientific notes of Vinnytsia State Pedagogical University named after Mykhailo Kotsyubynsky. Series: Geography, 28 (3–4), 18–26 [in Ukrainian].*
13. *Mil'kov, F. N. (1953). Influence of relief on vegetation and fauna (Biogeomorphological essays). Moscow, 164 [in Russian].*
14. *Mil'kov, F. N. (1947). On the phenomenon of vertical differentiation of landscapes in the Russian plain. Questions of geography, 3, 87–102 [in Russian].*
15. *Mil'kov, F. N. (1973). Man and landscapes. Essays on anthropogenic landscape science. Moscow, 224 [in Russian].*
16. *Mikhno, V. B., Gorbunov, A. S. (2001). Altitude and landscape complexes of the Cretaceous south of the Central Russian Upland. Bulletin of Voronezh State University. Series: Geography. Geoecology, 1, 16–24 [in Russian].*
17. *Fedotov, S. V. (2009). Vertical differentiation of lithogenic landscapes of plains and issues of their optimization in the*

Middle Desna basin. Problems of regional ecology, 6, 25–29 [in Russian].
18. *Fedotov, S. V. (2009). Leveling surfaces and the problem of vertical differentiation of lithogenic landscapes in the center of the Russian Plain. Bulletin of the Voronezh State University. Series: Geography. Geoecology, 2, 101–106 [in Russian].*
19. *Altitudinal Landscape Complexes of the Central Russian Forest–Steppe / A. S. Gorbunov, V. B. Mikhno, O. P. Bykovskaya, V. N. Bevz // Landscape Patterns in a Range of Spatio-Temporal Scales / A. V. Khoroshev, K. N. Dyakonov (Eds.). – Cham : Springer Nature Switzerland AG, 2020. – P. 207–220. https://doi.org/10.1007/978-3-030-31185-8.*
20. *Bu, X. Wang, Y., Wu, J. (2008). Effect of Landform on Landscape Pattern Vertical Differentiation in Rapidly Urbanized Shenzhen City. Acta Geographica Sinica, 63 (1), 75–82. http://www.geog.com.cn/CN/10.11821/xb200801008 [in Chinese].*
21. *Stadel, C. (2019). Horizontal and Vertical Archipelagoes of Agriculture and Rural Development in the Andean Realm. Sustainable Rural Development, 1–21. http://dx.doi.org/10.5772/intechopen.86841.*
22. *Buzhuo, P., Lijie, P., Haosheng, B., Higgitt, D. L. (1997). Vertical Zonation of Landscape Characteristics in the Namjagbarwa Massif of Tibet, China. Mountain Research and Development, 17 (1), 43–48. https://doi.org/10.2307/3673912.*
23. *Sun, R.-H., Chen, L.-D., Zhang, B.-P., Fu, B.-J. (2009). Vertical zonation of mountain landscape: a review. Ying Yong Sheng Tai Xue Bao. 20 (7), 1617–1624 [in Chinese].*

Висотна диференціація долинно-річкових ландшафтів правобережної України

Олександр Дмитрович Лаврик[1],
д. геогр. н., доцент, професор кафедри екології та географії
[1]Житомирського державного університету імені Івана Франка,
вул. Велика Бердичівська, 40, Житомир, 10008, Україна;
Володимир Іванович Корінний[1],
к. геол. н., доцент кафедри екології та географії;
Леонід Миколайович Кирилюк[2],
к. геогр. н., доцент кафедри географії
[2]Вінницького державного педагогічного університету імені Михайла Коцюбинського,
вул. Острозького, 32, м. Вінниця, 21100, Україна;
Валентина Василівна Цимбалюк[3],
к. хім. н., доцент, викладач-методист циклової комісії природничих дисциплін та математики
[3]КЗ «Уманський гуманітарно-педагогічний фаховий коледж ім. Т. Г. Шевченка Черкаської обласної ради»,
вул. Небесної сотні, 33, м. Умань, Черкаська обл., 20301, Україна

На основі попереднього досвіду розглянуто прояви висотної диференціації у межах долинно-річкових ландшафтів Правобережної України. У річкових долинах виокремлено 2 висотно-ландшафтних рівні («молодий» акумулятивний і «типовий» акумулятивно-денудаційний) та 4 яруси. Кожному натуральному висотно-ландшафтному рівню відповідає конкретний натуральний тип місцевостей та певні урочища. Відповідно для антропогенних висотно-ландшафтних рівнів характерними є свої типи місцевостей та долинно-річкові ландшафтно-технічні системи. Зазначено, що антропогенні ландшафтні комплекси у межах «молодого» акумулятивного висотно-ландшафтного рівня розповсюджені рівномірно. Для нижнього ярусу «молодого» акумулятивного висотно-ландшафтного рівня характерні мости, дамби, гатки, дериваційні ГЕС, «водяні» млини, антропогенні острови, ставки руслового типу або меліоративні канали. Середній ярус представлений водогосподарськими і сільськогосподарськими ландшафтами. Верхній ярус формують селитебні та гірничопромислові ландшафти. У річкових долинах «типовий» акумулятивно-денудаційний висотно-ландшафтний рівень має один нижній ярус, який сформований двома натуральними типами місцевостей: схиловим і каньйоноподібним. Цей ярус характеризується гарною збереженістю (до 35 %) натуральних ландшафтів. Антропогенні ландшафти представлені переважно лісокультурними, селитебними, сільськогосподарськими і дорожніми ландшафтними комплексами. Зроблено висновок про те, що при подальшій антропогенізації річкових долин варто здійснювати проєктування антропогенних ландшафтів, рівномірно й обґрунтовано розподіляючи їх по висотно-ландшафтних ярусах. У межах «молодого» акумулятивного висотно-ландшафтного рівня необхідно провести відновлення та оптимізацію водогосподарських ландшафтно-технічних систем, які перебувають на стадії «старіння». У подальшому ландшафти підлягають суцільному заповіданню уздовж долини. З метою збереження долинно-річкових ландшафтів тут потрібно заборонити будь-які господарські заходи крім оптимізаційних. Формування нових антропогенних ландшафтів має бути приурочене до ярусів вищих висотно-ландшафтних рівнів.

Ключові слова*: висотна диференціація ландшафтів, антропогенні ландшафти, долинно-річкові ландшафти, ландшафтно-технічні системи, річкові долини.*

Внесок авторів: всі автори зробили рівний внесок у цю роботу

Надійшла 20 грудня 2021 р.
Прийнята 25 грудня 2021 р.