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TERRITORIAL REGIONALIZATION OF LANDSCAPE TECHNOSPHERE IN LITHUANIA

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Abstract. The aim of investigation was to discover territorial differences in landscape technosphere (structural imprint from cultural and technological processes). The main processes forming technosphere are related to technology-bound areal changes that transform landscape through land use change and urbanization (the latter term taken in 'building up' sense). This specific layer can be divided horizontally into areas (1969 individual ones, in the Lithuanian case, averagely 33 km^2 in size each) with a homogeneous land-use structure and organically unbreakable techno-structural elements (settlements with a road net), these areas being named techno-morpho-topes (TMTs). Complex classification of TMTs according to the largest urbocomplex (settlements and other built-up complexes) inside them and dominating land-use gave 10 types of areal technogenization that were mapped. Analysis of classified TMT mosaic allowed to distinguish 53 individual technosphere regions having a homogeneous, irregular or rhythmic mosaic texture of TMT types. Asymmetry of regions in regard to large cities seems to be a dominating rule (the largest city is usually in the peripheral part of the region). The obtained data could be applied in land management by finding the best way to relate the administrative and economic regional system and technosphere structure. Relations of the technosphere regions with relief was traced in few places. This implies further investigations on the subject of relations between landscape natural and cultural elements, structures and processes.

Keywords: technosphere of landscape, Lithuania, technosphere regions, techno-morpho-topes, areal technogenization.

1. Introduction

The Lithuanian landscape is cultural in most of its parts, i.e. its natural component basement is covered by multilayered and diverse cultural "robe", like it was named by the Lithuanian scientist A. Basalykas (1977, 1979). The latter complex formation can be also dissociated into different spheres: technosphere (made up of settlements, infrastructure elements, archaeological monuments, and land-use patches) (Kavaliauskas and Veteikis 2004), biologic anthroposphere (consisting of humans as alive organisms), sociosphere (expressed mainly by streams and fields of socio-economic forces), and, finally, infosphere (or noosphere, manifested through information field (Kavaliauskas 1992; Kavaliauskas and Veteikis 2004)).

There can be derived parallels between cultural and natural landscape parts in regard to their component structure. Technosphere, comprising mainly the objects of solid physical phase (like buildings, etc.) could stand for the natural lithospheric basement. Anthroposphere, the mankind, established among this "concrete jungle", becomes an equivalent of biosphere in natural landscape. Sociosphere regulating the territorial distribution of most people and like water nourishing the lives of communicating people, becomes an equivalent of hydrosphere. The most difficultly determined infosphere like hardly predictable and intangible air masses create the cultural climate of the landscape.

However, today landscape is still understood and experienced mostly through the complex of external structures, mosaics, patches, pictures. Therefore, technosphere of landscape expresses itself and is received through the elements of material culture – mostly built up territories and land-use patches – formations created by processes of land surface exploitation and change. Besides these two gross technosphere elements, there are linear structures – various roads and boundaries. But the density and distribution of the latter is much related to the density of built up territories, therefore, the infrastructure elements can be considered as secondary in describing the technosphere of landscape.

Built up situation and land-use structure already have been used to describe the Lithuanian cultural landscape and to distinguish its regions by evaluating their cultivation character and cultural change degree (Kavaliauskas 1986; Lietuvos Respublikos … 2002, 2006). There were also some similar regionalization and classification works dedicated to local-level landscapes (Vaitkevičius 1991, 1992; Kavaliauskas, Kriaučiūnienė 1986; Kavaliauskas *et al.* 1993). However, in the mentioned works the character and degree of cultural change are used in a slightly different sense.

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What is in mind here is two different levels in dealing with landscape morphology: investigation of landscape technosphere and investigation of the very cultural landscape. The natural way of landscape morphological research would be investigation of landscape technosphere structure firstly, and integration of its results into the investigation or analysis of the cultural landscape secondly (including natural components like rocks, waters, soil, vegetation, etc). However, until now, the first stage is still little developed, while the second stage already requires solutions, especially for landscape management decisions. As a result, omitting the technosphere structure and its peculiarities, built-up and land-use structures are only used like irregular territorial data for describing natural landscape regions or refining their boundaries.

This fact can be seen even at an international level, e.g. landscape character map of Europe (Wascher 2005) where land use plays a role of only an additional descriptive layer, while urban areas are even excluded from all the rest landscapes with a full description of components. There is no attempt to analyse some regularities of the structures that are created in landscape by urban and countryside land-use complexes. Urban structures are likely to be out of focus of landscape researchers who distinguish large-scale types of landscapes, like on the map of European landscape types (Meeus 1995), although urban landscape or built-up landscape is emphasized since long ago as an inseparable part of today's environment, one of the most weighty elements of the technosphere (Naveh 1980, 1984).

It is pointful to mention here the existence of many specialized works (Bučas 1988a, b; Miškinis 1991; Purvinas 1999; Šešelgis 1996, Graužinis 2005, etc.) of urbanists and other architects who analysed urban and rural landscape of Lithuania mostly from historical perspective. There were attempts to investigate peculiarities of settlement landscapes in neighbouring Latvia (Šteins 1985).

Previously mentioned landscape technosphere investigations (that still are not quite well developed) are related to some works on technogenic structure of the Lithuanian landscape. There were 1969 technogenic (techno-morphological) complexes (Veteikis 2003c), later renamed to techno-topes (Veteikis 2003a, b), then to techno-morpho-topes (Lietuvos Respublikos … 2006) distinguished in the territory of Lithuania ('-tope' coming from the Greek 'topos' – a place, locality). The essence of the techno-morpho-tope (TMT) is a territorial unit with limits following the main land-use boundaries and with conditionally homogeneous or organically unbroken techno-structural contents. There is a difference from the smaller morphological cells that are distinguished inside urban areas, following the boundaries of built-up quarters, as offered in some previous works (Godienė 2000; Jankauskaitė *et al.* 2008). The main land-use boundaries taken into account while distinguishing TMTs, are between agricultural lands, forests and urbanized areas. The mentioned content of the TMT comprises urbanized nucleus, infrastructure frame (roads, railroads), land-use aureole, and other built-up sites. According to that complex inner structure, TMTs are classified into 4 types: radial, axial, dispersed and urbanized (Lietuvos Respublikos ... 2006). Even analysis of the territorial distribution of the mentioned 1969 four-type TMTs can give a large amount of information about landscape's techno-morphological aspects, however, this would form quite a narrow outlook on landscape technosphere.

The paper deals with the structural features of the technosphere, while many investigations are related to (mostly negative) processes that are generated by the technosphere (Zdankus *et al.* 2008; Baltrėnas *et al.* 2008). In this regard, knowledge of how pollution sources (as most of the urban areas as well as other technosphere elements can be considered as such) are distributed in the territory, their network structure could play an important role in further steps of land management.

2. Object and methods of investigation

The object of the investigation in general is the cultural landscape of Lithuania, in a narrow sense – its cultural (technogenic) structure, made up of built-up areas, infrastructure and land-use (agricultural, silvicultural, of natural swamps, etc.) divided into territorial complexes – techno-morpho-topes (TMTs). Each TMT was described by its inner structure according to the areal proportions of the mentioned structural elements. For this task the main methods applied were GIS-based overlay operations and database calculations. Later the process of classification, or to be more precise, grouping was performed for the 1969 TMTs. This comprised the following actions.

The type in TMTs is best represented by areal technogenization, i.e. the spread of technogenized land plots. Technogenized plots are territories that experienced bigger or lesser impact from technologies and therefore belong to the used-land category, or land-use. The most technogenized land plots are industrial, residential, mining (including peat-mining), dumping and similar sites. Less technogenized are agricultural, the least – conditionally natural silvicultural sites as well as swamps, natural meadows.

For distinguishing the type of areal technogenization, two features were identified and extracted. The first feature was the type of urbocomplex (or urban site) that occupies the largest area in the TMT. Urbocomplex is a compact and functionally homogeneous territorial complex of buildings connected by a communication network. TMT can have various types of urbocomplexes inside it – settlements, industrial or power plants, but all of them can be classified into five classes by their size (Veteikis 2003b):

1. Very large urbocomplex, >300 ha (large cities or their parts like Vilnius, Joniškis; large power or industrial territories like Mažeikiai "Nafta", Ignalina Nuclear Power Plant);
2. Large urbocomplex, 300–150 ha (medium-size cities like Visaginas, Adutiškis, Žiežmariai);
3. Medium urbocomplex, 150–50 ha (small cities, towns or large villages like Skirsnemunė, Vandžiogala, Čiobiškis);

4. Small urbocomplex, 50–2 ha (villages like Vosbutai, Minija, Braziukai);
5. Very small urbocomplex, <2 ha (single homesteads or separated building complexes with yards).

As mentioned above, TMT were classified according to the type of urbocomplexes that occupy the largest areas inside each of them. E.g., if there is 1 city of 250 ha (large urbocomplex), 5 villages occupying 180 ha and 20 homesteads taking 60 ha in TMT, its type is that of "high urbanization."

The second feature of TMT is the land-use type dominating by area in TMT. Using the land cover classification of CORINE (CLC2000/20 database, ©Environmental Protection Agency) there were 9 generalized land-use types distinguished in TMTs. In some cases (only 35 from 1969) urbocomplexes themselves are the most dominating land-use type in a TMT. On the other hand, the most frequent dominating land-use type in Lithuania is an agricultural one. In this case, TMTs would be given an agrarian type. Taken together, types of the largest by area urbocomplex and dominating land use, give a complex TMT type, like "highly urbanized agrarian." Totally there are 10 complex TMT types according to the areal technogenization (Table 1).

Generally, classification of TMTs according to areal technogenization allows to reveal the peculiarities of the Lithuanian landscape technosphere. Statistical summary of the distribution of TMT types shows that the most frequent is "village agrarian" and "homestead natural", while the rarest is the "industrial-mining" type. The latter comprises mainly exploited peat-bogs.

Later on, the described types of TMTs were mapped and visualized using ArcGis programme for further cartographic analysis of the TMT-types mosaic (Fig. 1). An expressive map legend was created for visualizing the mentioned mosaic in order to perform its regional analysis. Following the differences in the mosaic picture and color rhythm, 53 unique regions were distinguished, though some of them are quite similar by their mosaic type. For description of the regions, some statistical methods (summarizing the TMT number and the total area of the region, calculating its part in the area of Lithuania) were applied. Visual interpretation was applied for discovering some interesting features of the distinguished regions and correlating them with natural landscape features like relief and geosystem resistance to chemical impact.

3. Results and discussion

As mentioned previously, in the Lithuanian territory there were distinguished 53 individual technosphere regions containing a specific TMT mosaic (Fig. 1). It is notable that shapes of the regions are sometimes quite related to geomorphological features of the Lithuanian territory, obviously in the Baltic and Žemaitija highlands, Southeastern Sandy Plain, southeastern territories of the next-to-last glaciation, in some northern areas.

Table 1. Types of TMTs areal technogenization (the cells of the table contain the number of TMTs of a respective type)

Type of the urbocomplex dominating by area / Dominating land-use type*	1. Very large	2. Large	3. Medium	4. Small	5. Very small	0. No settlements
1. Industrial, commercial and infrastructural	4			1		
2. Residential territories	30	1				
3. Territories of degraded landscape (quarries, dumping or constructing sites)	[1]			[2]		
4. Exploited peat-bogs				4	2	2
5. Agricultural land plots	23	54	263	727	148	
6. Conditionally less or rarer technologically influenced agrarian areas (agrarian areas with enclaves of natural vegetation, pastures, fruit tree/brush plantations)	[3] 1	5	[4] 8	[5] 36	[6] 40	1
7. Conditionally natural land plots (forests, swamps, meadows, larger settlement greeneries)	11	7	26	167	392	9
8. Artificial water ponds	[7]		[8]	[9]	[10] 1	1
9. Natural water bodies				2	3	

The distinguished types of TMT areal technogenization (numbers in gray squares): 1 – industrially-residentially built-up, 2 – industrial-mining, 3 – highly urbanized agrarian, 4 – averagely urbanized agrarian, 5 – village agrarian (rural concentrated), 6 – homestead agrarian (rural dispersed), 7 – highly urbanized in natural background, 8 – averagely urbanized in natural background, 9 – villages in natural background, 10 – homesteads in natural background.

*Land-use types grouped using the classification of CORINE (CLC2000/20 data base, ©Environmental Protection Agency).

The distinguished regions are different in regard to their shape and inner texture, i.e. the picture of the TMT mosaic. E.g. there are several bar-like regions: two parallel neighbouring in southern Žemaitija (Samogethia) (Nos. 20 and 33), one of a curved-bar shape in middle Žemaitija (No. 11). There are several quite homogeneous (with one dominating TMT type) regions – in Baltic highlands (No. 39), southwestern Lithuania (No. 41), southern Lithuania (No. 51). Besides them, there are few small but quite unique areas characterized by a specific TMT mosaic, unseen anywhere else in Lithuania, e.g. Skuodas land (No. 2). There are also some regions that could be called transition or peripheral areas, but still they are distinguished as independent units. Usually they are narrow or small and located at the corners of the larger regions contact. Examples of such areas are a little stripe covering Pakruojis town (No. 13), tiny regions of Darbėnai-Kūlupėnai (No. 7) or Lenkimai-Šventoji (No. 1), a narrow bar (No. 19) by the eastern periphery of Klaipėda region (No. 9). The Curonian Spit (18) with its unique landscape was also distinguished as a different region, though its narrowness is a totally natural feature.

There is still no all-explaining answer why mosaic elements spread like it is described above, this needs further exploration. Especially interesting is one feature of many distinguished regions, because of that, even called lands, not mere regions. It is their asymmetry in regard to the largest city inside them. It is relevant to at least 11 regions containing the largest cities of Lithuania: Vilnius, Kaunas, Šiauliai, Klaipėda, Panevėžys, Alytus, Mažeikiai, Plungė, Ukmergė, Tauragė, Marijampolė. It seems that homogeneous or rhythmic TMT mosaic stretches from the massive city into one (Šiauliai (No. 12), Tauragė (No. 31) cases) or two (Kaunas, (No. 43), Panevėžys (No. 14) case) separate directions or forms a fan-like semi-circle (Vilnius (No. 48), Klaipėda (No. 9), Marijampolė (No. 41) cases).

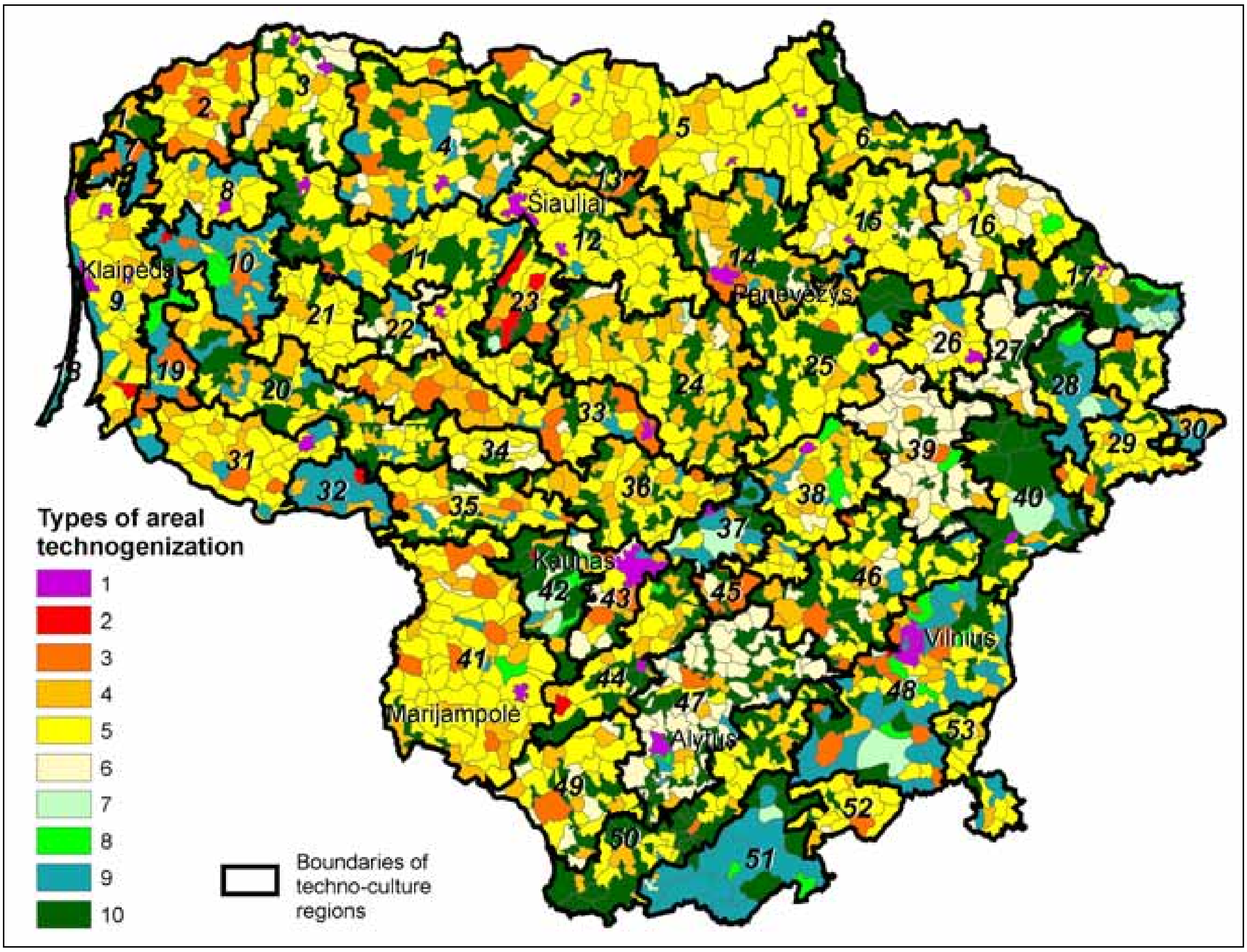

Fig. 1. Regions of the Lithuanian landscape technosphere. Numbers on the map show individual technosphere regions delimitated by a thick black line (for names see Table 2). Numbers in the legend represent the areal technogenization type of a TMTs: 1 – industrially-residentially built-up, 2 – industrial-mining, 3 – highly urbanized agrarian, 4 – averagely urbanized agrarian, 5 – village agrarian (rural concentrated), 6 – homestead agrarian (rural dispersed), 7 – highly urbanized in natural background, 8 – averagely urbanized in natural background, 9 – villages in natural background, 10 – homesteads in natural background

Vilnius is an interesting region (No. 48) with a rather diverse mosaic stretching mostly to the east and southeast of Vilnius, while just in a few kilometers to the west of the capital, in the direction of Kaunas, there is quite a differently-textured Vievis-Maišiagala region (No. 46).

The two mentioned parallel regions in southern Žemaitija (Nos. 20 and 33) can also attract some attention as they might have relation with two parallel highways called Žemaičiai Highways (Samogethian Highways), an old road and a new one, a real modern highway. Only one of the regions (No. 33) covers both highways, but this is enough to create a parallel though shifted to the west and with a different mosaic region (No. 20) by its side.

Further description of the technosphere regions is given in Fig. 2 that shows the diversity of their inner structure according to the distribution of TMT types. Larger areas, as it was mentioned previously, are called lands in relation to the largest region city, a technosphere mass center. Such lands can totally disagree with the traditionally delimited regions or administrative districts attached to the respective cities. A separate table gives region names, TMT numbers inside them and areas (Table 2).

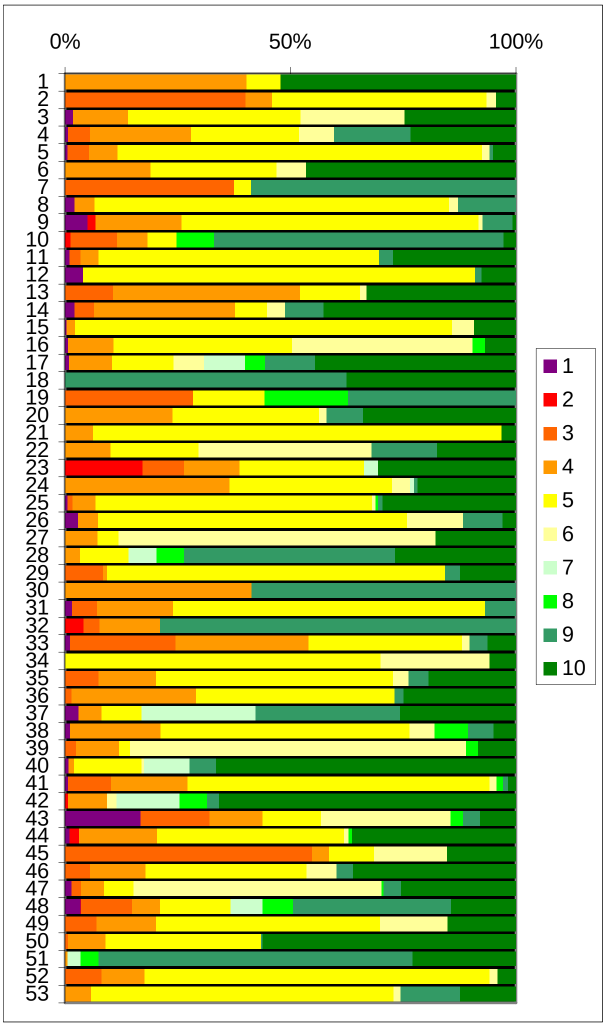

Fig 2. Inner proportional structure (by TMT technogenization types) of 53 technosphere regions of Lithuania. Numbers in the legend represent the areal-technogenization type of a TMT (same as in Fig. 1). In a vertical axis numbers refer to technosphere regions (see Fig. 1 and Table 2)

Table 2. Data of technosphere regions (region numbers are respective to those in Figs. 1 and 2)

Region No.	Number of TMTs in region	Region name	Area, km^2	PART OF LITHUANIAN AREA %
1	9	Lenkimai–Šventoji	298.7	0.5
2	28	Skuodas land	909.7	1.4
3	45	Mažeikiai land	1324.9	2.0
4	58	Kušėnai land	2247.8	3.5
5	89	Joniškis–Biržai	3821.8	5.9
6	39	Juodupė	1181.2	1.8
7	7	Darbėnai–Kūlupėnai	294.8	0.5
8	21	Plungė land	752.3	1.2
9	39	Klaipėda land	1494.5	2.3
10	27	Rietavas	981.1	1.5
11	64	Telšiai–Kelmė	2706.9	4.2
12	31	Šiauliai–Radviliškis	1472.3	2.3
13	17	Pakruojis	476,.8	0.7
14	47	Panevėžys land	1859.5	2.9
15	35	Kupiškis land	1371.7	2.1
16	33	Rokiškis land	1156.7	1.8
17	26	Zarasai	1054.0	1.6
18	6	Neringa	101.3	0.2
19	14	Šilutė–Švėkšna	603.3	0.9
20	61	Endriejavas–Eržvilkas	1889.1	2.9
21	23	Kaltinėnai–Tverai	857.4	1.3
22	14	Kražiai	458.1	0.7
23	19	Tytuvėnai	675.9	1.0
24	82	Baisogala–Šėta	2409.0	3.7
25	43	Raguva–Kavarskas	1704.9	2.6
26	17	Utena land	635.6	1.0
27	21	Tauragnai	773.4	1.2
28	21	Ignalina–Salakas	754.8	1.2
29	44	Švenčionys–Dūkštas	1190.0	1.8
30	4	Didžiasalis	190.6	0.3
31	39	Tauragė-Pagėgiai	1238.2	1.9
32	12	Viešvilė	496.3	0.8
33	47	Raseiniai–Kėdainiai	1622.9	2.5
34	14	Pramedžiava	482.9	0.7
35	37	Jurbarkas–Vilkija	1093.8	1.7
36	49	Babtai–Vandžiogala	1257.8	1.9
37	26	Jonava	618.3	1.0
38	54	Ukmergė land	1315.8	2.0
39	46	Molėtai	1475.9	2.3
40	36	Labanoras-Pabradė	1445.6	2.2
41	87	Marijampolė land	3018.5	4.7
42	22	Kazlų–Rūda	763.6	1.2
43	26	Kaunas	706.2	1.1
44	42	Prienai	1151.5	1.8
45	10	Kaišiadorys	236.4	0.4
46	70	Vievis–Maišiagala	1898.0	2.9
47	103	Alytus land	2155.0	3.3
48	89	Vilnius land	2682.4	4.1
49	47	Lazdijai-Seirijai	1280.3	2.0
50	66	Leipalingis–Daugai	1786.6	2.8
51	24	Varėna–Druskininkai	1419.9	2.2
52	19	Eišiškės	542.2	0.8
53	20	Dieveniškės	555.1	0.9

According to the map (Fig. 1) and structure graph (Fig. 2), it is seen that in most of the regions TMTs of the 5th type (village agrarian or rural concentrated) predominate, however, there are regions that have no or almost no TMTs of this technogenization type (regions Nos. 30, 32, 7, 39, 42). Some regions, on the contrary, are almost made of village agrarian type TMTs (Nos. 8, 5, 21). The graph helps to distinguish the most homogeneous regions, the largest of them being Marijampolė (No. 41), Joniškis–Biržai (No. 5), Šiauliai–Radviliškis (No. 12), Kaltinėnai–Tverai (No. 21), Molėtai (No. 39) regions, and the most diverse ones – Vilnius (No. 48) and Kuršėnai (No. 4) lands.

A discussion could be initiated in regard to the ways of application of the data acquired. The main field of application is land management and there can be two directions of the technosphere regionalization interpretation. Firstly, it is quite interesting to investigate, how the technosphere structure correlates with administrative regions of Lithuania, and find the main points that connect and/or diverge the two regional systems. Here there could be performed a two-directional analysis of administrative and also infrastructural network optimality in regard to the technosphere regional system and vice versa – the optimality of the technosphere structure covered and governed by administrative regions. What could be used in the mentioned analysis is the discovered regularity of technosphere regions, i.e. the asymmetry of the regions in regard to its largest urbocomplex.

The other way to apply the discovered data in land management is related to optimizing the government of use of land and natural resources. Especially, this is applicable to homogeneous by TMT-types regions (like Nos. 5, 12, 15, 39, 41, 51, etc.). What could be suggested in the regions with specific TMT-type structure is to optimize the location of the land- and resource-managing center, probably planning the shift of the largest urbocomplex to a more reasonable place (than periphery) in the region. It must be proved before, of course, by a special research, but the visual analysis of the technosphere regionalization map offers that almost each technosphere region could have a more centrally located settlement being developed to a larger urbocomplex that could have more governing functions than it has now. The offer is unconventional and the examples are alike: the central settlement to strengthen for Joniškis–Biržai region (No. 5) could be Pašvitinys, for Varėna–Druskininkai region (No. 51) – Marcinkonys, for Marijampolė land (No. 41) – Vilkaviškis, etc. In many cases these are small and usually treated as periphery settlements. Being in the center of a technosphere region could prove their development increase thus aiding in decentralization of economy and employment in the country.

While writing this paper, the authors were also interested to know whether there was any relation between technosphere regions and some other structures of landscape like relief, therefore, an attempt was made just to make a visual comparative analysis by overlaying technosphere regions and relief map. The mentioned pair of structures have relations due to the relief's influence on the land-use structure. Actually, the overlaying proves that it is true to some extent: in a hilly area there are more TMTs of a rural dispersed type than anywhere else. However, it must be noted that search for of relations between technosphere and natural elements require a deeper focus than it was mentioned here, where even a slight touch with that problem revealed the multiplicity and complexity of the issue.

4. Conclusions

The technosphere of landscape is best reflected by technogenic processes that create urbocomplexes (settlements or industrial/power area), infrastructure and land use – the main cultural elements of landscape. These elements disperse and cluster in the territory into distinctive territorial units – technomorphotopes (TMTs), 1969 of them covering the whole area of Lithuania.

Technomorphotopes (TMTs) can be classified by a dominating type of urbocomplex (settlement or industrial/power area) and by a dominating land-use type (from residential, industrial to silvicultural, or of natural swamps). Cross-grouping of these two classification lines gives an integral classification of TMTs, the so-called classification by areal technogenization, having 10 types from industrially-residentially built-up to homesteads in the natural background.

Mapping the areal technogenization of TMTs allows to distinguish areas with different landscape technosphere (according to differences in TMT mosaic). 53 technosphere regions were distinguished in Lithuania. The inner texture of the regions can be (relatively) homogeneous, rhythmic or disordered.

Many regions are characterized by asymmetry in respect to the largest city they cover – the region with a specific mosaic seems to be grown towards some one or several selected directions, not evenly round the largest city. This feature of the technosphere regions requires some additional investigation.

The aspect of application of the obtained data could be expressed through analysis of twofold optimality: optimality of an administrative region network and/or infrastructure network in regard to the technosphere structure, and optimality of the technosphere structure on the background of administrative regional structure. Also, there can be a discussion on developing centrally in a region-located settlement as an economic and cultural center of a technosphere region, having more government functions in regard to land use and natural resource exploitation in a respective region.

Visual overlay of technosphere regions with relief map revealed that there are some relations between the mentioned phenomena, however, far from overwhelming. The reasons for that must be sought in the course of further landscape technosphere research.

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LIETUVOS KRAŠTOVAIZDŽIO TECHNOSFEROS RAJONAVIMAS

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S a n t r a u k a

Tyrimo tikslas buvo atskleisti kraštovaizdžio technosferos (kultūrinių procesų struktūrinio įspaudo) teritorinius skirtumus Lietuvoje. Pagrindiniai kultūrinimo procesai susiję su plotiniais pokyčiais. Kraštovaizdžio transformavimasis vyksta dėl žemėnaudos pokyčių ir urbanizacijos (užstatymo plėtros prasme), įgyvendinamų technologijų. Sukultūrinimas lemia ypatingą sluoksnį ant gamtinių kraštovaizdžio komponentų. Horizontaliai šis sluoksnis gali būti suskaidytas į nedidelius plotus (Lietuvoje – 1969 vidutinio 33 km^2 ploto individualius arealus), kuriuose homogeniška žemėnaudos struktūra ir organiškai vientisi technostruktūriniai elementai (gyvenvietės ir kelių tinklas). Šie teritoriniai vienetai pavadinti technomorfotopais (TMT). Remiantis kompleksine TMT klasifikacija, pagal didžiausią jų viduje esantį urbokompleksą (gyvenvietė arba kitas užstatytas plotas) ir vyraujančią naudmeną nustatyta 10 plotinės technogenizacijos tipų. Jie buvo kartografuoti. Analizuojant klasifikuotų TMT mozaikos žemėlapį išskirti 53 individualūs technosferos regionai. Vienų jų TMT plotinės technogenizacijos tipų mozaika, jos tekstūra vienalytė, kitų netvarkinga, trečių ritmiška. Paplitęs bruožas – daugelio regionų asimetrija didžiausio jiems priklausančio miesto atžvilgiu (didžiausias miestas paprastai yra regiono periferijoje, paribyje). Gauti duomenys gali būti pritaikyti kraštotvarkoje geriausiai sąsajai tarp administracinių bei ekonominių regionų ir technosferos struktūros rasti. Ryšys tarp technosferos regionų ir reljefo bruožų pastebimas tik dalyje Lietuvos teritorijos. Ryšiams tarp kraštovaizdžio gamtinių ir kultūrinių elementų, struktūrų ir procesų atskleisti būtini išsamesni tyrimai.

Reikšminiai žodžiai: kraštovaizdžio technosfera, Lietuva, technosferos regionai, technomorfotopai, plotinė technogenizacija.

РАЙОНИРОВАНИЕ ЛАНДШАФТНОЙ ТЕХНОСФЕРЫ В ЛИТВЕ

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Р е з ю м е

Целью исследования было выявление территориальной неравномерности техносферы (структурного отпечатка культурных процессов) ландшафта в Литве. Главные процессы окультуривания связаны с площадными изменениями, которые осуществляются с помощью технических приспособлений, трансформирующих ландшафт через изменения земельных угодий и урбанизацию (распространения застроенных площадей). Слой техносферы, как бы надетый на природные компоненты ландшафта, горизонтально может быть расчленен на небольшие ареалы (в Литве – 1969 единиц со средней площадью 33 км^2) с однородной структурой землеугодий и органически целостными техно-структурными элементами (населенными или другими застроенными местностями с дорожной сетью). Эти территориальные единицы названы техноморфотопами (ТМТ). Комплексная классификация ТМТ по двум признакам – доминирующему по площади типу застроенной территории (урбокомплекса) и доминирующих землеугодий – дала 10 типов площадной (ареальной) техногенизации, что было картографировано. Анализ типовой мозаики позволил выявить 53 индивидуальных района окультуривания с разными текстурными типами мозаики: однородным, беспорядочным или ритмичным. Наблюдается закономерная асимметрия многих районов, заключающих в себе большие и средние города: самая большая населенная местность находится на окраине, почти примыкающей к границе района. Полученные данные могут быть использованы в краеустройстве при нахождении оптимальной взаимосвязи между административной, а также экономической территориальными структурами и регионами техносферы. Территориальная связь между районами техносферы и рельефом наблюдается лишь местами. Поэтому необходимы более детальные исследования для выявления связей между природными и культурными элементами, структурами и процессами.

Ключевые слова: техносфера ландшафта, Литва, районы техносферы, техноморфотопы, площадная (ареальная) техногенизация.

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