Mariya Benovska

URBAN SPRAWL IN THE POST-SOVET SPHERE IN COMPARISON OF LVIV, UKRAINE AND RIGA, LATVIA

VALGLINNASTUMISE TOIME VÕRDLUS POSTSOVETISTLIKEL ALADEL LVIV (UKRAINA) JA RIAA (LÄTI) NÄITEL

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Supervisor: professor Simon Bell, PhD

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Eastern European countries were under the influence of communist regime for decades. However, after the dissolution of Soviet Union, some countries have joined the EU, but some of them remained to stand aloof. Different directions of political and spatial developments significantly affected the spatial pattern, economic prosperity and human preferences.

The aim of this work is to investigate processes triggering an expansion of post-soviet cities, define patterns of sprawling areas with the emphasis on peri-urban by taking 2 strategical cities Lviv, Ukraine and Riga, Latvia as case studies.

Data for the research was collected through map analyses and information studies about the areas. The methodology was divided into three parts. Stage one was the analysis of aspects in each case-study city that deals with the spatial development and affects these spatial processes. Stage two was the assessment of urban sprawl in selected areas of each case-study city. Stage three was the comparison of achieved results from stage one and two between all selected areas.

The findings show that all selected areas are sprawling, but in different degrees. The main causes of the phenomenon are changes of human preferences and household structures, economic growth, weak planning and population decline. Both cities and its regions will confront in near future with the spatial and economic issues.

Keywords: peri-urban, urban sprawl, post-soviet countries
Ida-Euroopa maad olid aastakümneid kommunistliku režiimi mõju all.

Peale Nõukogude Liidu lagunemist on osad maad ühinenu Euroopa Liiduga, aga osad neist on jäänud seisma oma ette. Erinevad poliitilised ja ruumiarengu suunad on tunduvalt mõjutanud antud riikide ruumilist struktuuri, majanduslikku olukorda ning kodanike eelistusi.

Antud töö eesmärk on uurida endiste Nõukogude Liidu aegsete linnade arengu mustreid, keskendudes eelkõige linna äärealadele, valides strateegiliselt uurimiseks kaks linna: Lviv Ukrainas ja Riia Lätis. Andmeid antud uurimuse tegemiseks kogut oli erinevate aspektide analüüs, mis on setud linna ruumilise arenguga ja teguritega, mis mõjutavad ruumilise arengu protsesse. Teine etapp oli valglinnastumise uurimine valitud linna lähiümbruses. Kolmas etapp oli kahe eelmise etapi jooksul kogutud juhtumuuringu alade andmete analüüsi tulemuste omavaheline võrdlemine.

Analüüs näitab, et kõikides toimub valglinnastumine, seda aga erinevas mahus. Antud fenomeni põhjuseks on osad seiskevad inimeste eelistustes, leibkonna struktuuris, majanduslikus arengus, nõrgas planeerimises ja rahvastiku vähenemises. Mõlemate linnad ja neid ümbritsevad regioonid seisavad lähitulevikus silmitsi ruumistik ja majanduslike probleemidega.
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INTRODUCTION

Following the collapse of Soviet Union the global depopulation in Eastern Europe was observed. (Bell, 2010, p. 34) The massive out-migration from rural areas to towns, and afterwards partly abroad, has been continuing for the last 26 years.

Another major characteristics pertaining post-soviet countries are the aging tendency and low fertility. Despite the fact of large-scale out-migration, the built-up areas in rural-urban region have sharply increased in recent years. This fact serves as an evidence of sprawling areas.

Nowadays, 2 post-soviet cities: Riga and Lviv face new challenges, such as movement of middle-class people to so called “peri-urban areas” that subsequently leads to the urban sprawl as well.

“Sprawl has varying definitions, and the central component of most definitions is low density, the pattern of land use conversion which exceeds the population growth rate over the specified period and changes of the rural landscape and farmlands, parks and other natural areas into man-made environments.” (Jansons, 2011, p. 46)

This thesis addresses the topic of “peri-urbanization” in countries of Eastern Europe. The aim of the research is to analyse the current situation of peri-urban pattern in two case study cities: Lviv (Ukraine) and Riga (Latvia) through the prism of different aspects and factors triggering spatial expansion, find the catalysts of urban sprawl in two chosen studies, thus considering these nuances during the spatial planning and decision-making in rural-urban regions.

The research tasks for this thesis are as follows:

- Define sprawling patterns in peri-urban in each case study and the major causes of sprawl
- Compare similarities and differences of the urban sprawl in two case studies
- Anticipate future challenges for cities and its regions
1.1. What is the peri-urban?

“The peri-urban is the area between urban settlement areas and their rural hinterland. Larger peri-urban areas can include towns and villages within an urban agglomeration. Such areas are often fast changing, with complex patterns of land use and landscape, fragmented between local or regional boundaries.” (Tosics, Nilsson, 2010, p.10)

Figure 1 denotes the meaning of “peri-urban areas” and “rural urban region” as a geographic concept. It shows that the rural hinterland, urban fringe and urban periphery are the main components of peri-urban areas and rural-urban regions are the overall territorial unit including functional urban area (the urban area + peri-urban area) and rural hinterland. (Appendix 1)

Urban sprawl is the spatial development phenomenon characterized by the low populated areas on the urban outskirts, caused by the uncontrolled urban expansion.

There is no doubt that urban development is the most rapid type of land use changes and it is anticipated that in any chosen scenarios urban expansion will continue at 0.5 – 0.7 % per year. Peri-urban areas are growing four times faster than urban areas and these areas can be doubled in 30-50 years. Peri-urban expansion can affect economy: lead to dependency on oil for traffic and growth of transport infrastructure; cause severe traffic congestions and fragmentize lands. Consequently, these effects can be one of the reasons for social segregation. However, rapid urban development has many positive effects, such as a formation of innovative places and increase of employment rate. (Nilsson, 2010, p.7)

Figure 1. Peri-urban areas & the ‘rural-urban-region’, Geographic concepts & definitions as used in the PLUREL project (Source: UOM, ZALF, MRI)
1.2. Peri-urbanization process in post-soviet cities since 1990s

Suburbanization and peri-urbanization are the processes that in short period make changes in land use pattern and socio-spatial structure. These processes bring irreversible changes into the spatial structure thus affecting economic, social and environmental aspects.

In contrast to West European countries, the urbanization pattern of communist countries was accompanied by the concentration of investments in large and medium sized cities, while rural hinterland received minimum investments and experienced stagnation. Mass housing estates and large industrial complexes were put up in suburbs of most communist cities. (Ludek Sykora, Martin Ourednicek, 2007)

However, the structural changes in economics of post-soviet countries and the transformation of centrally planned economy to market one provoked new spatial changes in the rural-urban structure.

Privatization processes and economic transformation gave rise to commercialization of historical parts of cities, renovation and upgrading of different city parts, transformation of brownfields, residential peri-urbanization, etc.

Significant income growth after economic structural changes has reflected on the human preferences as well as on their lifestyles. Rural hinterland is considered as an attractive place for residential purpose with the lower price on land and higher environmental quality. Therefore, in last few years suburban and peri-urban areas started to be the most quickly changed fabric.

Nowadays, peri-urban areas in former communist countries consist of existing villages and emerged residential settlements with contrasting population - high and low income earners, well-educated and less educated residents. (Ludek Sykora, Martin Ourednicek, 2007) This contrast contributes to the socio-spatial structure and reflects on affordability and migration issues.

Although post-soviet countries experience gradual transformation, different political directions affect the pace of economic development and the welfare of residents. Consequently, it makes the spatial structure changes tightly connected with country’s governmental system and political aspects.
1.3. City typologies

Because of the constant growth of urban population, cities remain the main engines of country’s economy. City typologies based on economic indicators, such as city GDP, population number and density, climate conditions, consumption of different types of resources etc.

1.3.1. Typology of Ukrainian cities

Typology of Ukrainian cities can be classified across two dimensions – change in urban footprint and intensity of economic activity. The assessment was done according to night-light (NLs) data, where cities were categorized by the increasing or decreasing economic activity and growing or shrinking urban area footprint. (Ukraine Urbanization Review, 2015, p. 67-68)

![Figure 2](image)

**Figure 2.** Changes in NLs urban footprint vs. changes in NLs intensity in the urban core (Source: Ukraine Urbanization Review)

**Type 1:** cities with a thriving urban core and an expanding footprint.

**Type 2** cities with a diminishing urban core and shrinking area.
**Type 3** cities with a diminishing urban core and an expanding footprint.

**Type 4** cities with a thriving urban core and shrinking area.

Only 22% of Ukrainian cities belong to the Type 1 (Figure 2) that continue to grow economically despite declining population that is the lowest among other types. In addition, it presents one of the highest levels of economic activity and is one of the most productive cities in Ukraine. In addition, it has a highest average total economic growth and it is one of the country’s engine. The simultaneous expansion of urban footprint with the observed demographic decline indicates that city is sprawling. (Ukraine Urbanization Review, 2015, p. 88)

Another two distinct city types could be characterized by the decline of economic activity and diminishing of urban core. Type 2 are the cities with population, on average 54,000 and constitute the majority of Ukrainian cities – 53%. These cities have a dramatic decline in all aspects: diminishing urban core, population decline and decreasing economic activity. 24% of cities in Ukraine belong to Type 3 cities that have a tendency to the decline of economic activity and experience a sharp population decline accompanied by the depopulation indicates on the sprawl. Finally, Type 4 are cities that are showing a concentration of its economic activity despite a shrinking footprint. (Ukraine Urbanization Review, 2015, p. 66).

Nowadays, Ukraine is the country with the highest decrease in the natural birth rate among other post-soviet countries, with a natural decrease of 0.8% each year. Ukraine is expected to lose 28% of their population between now and 2050 (from 46.8 million now to 33.4 million in 2050) in comparison to Latvia’s -0.5%; -23%. (Matt Rosenberg, 2017).

Figure 3 shows the proportion of 4 types cities according to the region. From this bar chart, it can be concluded that the majority of thriving cities in Ukraine are in western region. Also, it may lead to the assumption that some cities are sprawling.
1.3.2. Typology of Latvian cities

Demographic and city shrinkages have seriously affected Latvian countryside in the last two decades. Pužulis and Kūle describe in their work this phenomenon in Latvian context trying to understand spatial shrinking pattern (Figure 4) and analyse demographics, employment and economic structure data in the peripheral north–eastern rural municipalities. (Pužulis, Kūle, 2016, p.91)

Figure 3. The distribution of types of cities varies by region; (Source: Ukraine Urbanization Review)

Figure 4. Growth and shrinkage territories in Latvia (Source: Pužulis, Kūle)
Only 2 medium-size Latvian cities: Valmiera and Ventspils (Figure 4) are stable and expect growth. The rest cities: Riga, Jurmala, Liepaja, Jelgava, Jekabpils, Daugavpils, Rezekne have a shrinking urban core.

1.4. Housing development

The transition period to the market economy in post-soviet period influenced on privatization process as well as on housing market.

Rapid urbanization process in the world has created a demand in post-communist countries on affordable housing within the city boundaries. Suburban area served as a good place for the new housing development.

The dominance of single households is the general tendency in urban areas, especially in the last decades. The households with three, four or more people dominated, one or two person is a common structure today. (Kabisch, Grossmann; 2013)

1.4.1. Housing development in Ukraine

Figure 5. New built-up areas 2000-2014 (Source: Ukraine Urbanization Review)
The Global Human Settlement Layer provides the measurements of built-up areas during 2000-2014 (Figure 5). Based on this data the diagram shows the information with the highest enlargement of built-up areas of different 40 countries. Ukraine ranks 5th, with 76,202 square kilometers added to the built-up area foundation, while at the same period the country experienced negative population growth. Ukraine presents one of the highest rate of built-up area per person. Weak spatial planning and the process of new country formation gave a push towards the expansion of artificial surfaces in areas, which are defined as peri-urban. (Ukraine Urbanization Review, 2015, p. 74)

1.4.2. Housing development in Latvia

In the second half of 1990s, after the regaining the independence, the construction boom started in the major cities. At that time city planners and architects made efforts to rebuild and restore historical buildings in the old town trying to get back the cultural symbols lost after Second World War. Simultaneously, cities were enlarged with new residential constructions in suburbs. (Oliveira, 2013)

Many microrayons were planned only 1980’s, therefore many constructions (Figure 6) were unfinished and after economic boom in 2000’s most of them were completed.

Figure 6. Completion of the old building structure in 2000’s (Google Images)
In comparison to the coastal areas in Europe, Latvian coastline experienced less intensive housing expansion than in the other countries. The pattern of new built-up areas can be traced in cities such as Riga, Jurmala, Ventspils, Jelgava, Liepaja, etc (Figure 7). However, most of these cities demonstrate considerable population decline. These facts lead to the assumption that main Latvian cities are sprawling.
2. LITERATURE REVIEW

2.1. Economic trends and employment

“The contemporary processes of metropolisation, deindustrialisation and demographic change have a profound and mutually reinforcing impact upon the structure of land use and the relations between urban, peri-urban and rural areas in Europe.” (Korcelli, Kozubek; 2010, p. 44)

In the analysis of relations between economic development and land use characteristics was revealed the spatial polarization tendency. The income gap between functional urban area and rural areas has been widening. (Korcelli, Kozubek; 2010, p. 44)

However, peri-urban areas are characterized as innovative zones and zones of rapid economic changes. (Ravetz, Piorr, Tosics; 2010) The deconcentration of economic activities and relocation of working spaces from the urban core to the areas with better environmental quality and good infrastructure make this area attractive for businesses. Although, in comparison to highly urbanized areas, peri-urban areas are generally characterized by relatively small gross domestic product per capita values. (Korcelli, Kozubek; 2010, p. 47)

The specific policy objectives for peripheral areas should be included into the long-term perspectives. First of all these actions should aim towards the improvement of quality and access to public services with education as a priority, preserving high-quality environment, enhance and reinforce connectivity with bigger urban centers, revitalize smaller towns with cultural and historical assets. (Korcelli, Kozubek; 2010, p. 49)

Simultaneously, in the dense-populated urban cores, the focus should be put on the revitalization, restructuring or utilization areas, such as brownfields. This issue remains one of the major challenge for post-communist countries.
2.1.1. Economic trends and employment in Ukraine and Latvia

During the Soviet regime, rural areas were used for the purpose of collectivization, where the common fields were enlarged and used for machinery-based cultivation. All these processes were controlled by the government and were called ‘5 year plans’. Once the system collapsed and both countries became independent, many social and economic forces were released. The land was returned to the original owners and collective farms were desolated. The lack of jobs, pure quality of life and education were the major factors triggering outflow migration. Already weak governance was confronted with new social and economic challenges that had required radical actions. The process of depopulation brought both countries to the social and economic isolation in the remote rural areas. (Bell, 2010, p. 34).

In addition, after the crash of the regime, both countries were targeted towards shifting from a centrally planned economy to market economy. Since 2004 Latvia is a part of the EU that help country to accelerate the restructuring of economy. While Ukraine still experiences this transition economic period. Unfortunately, as an opposite to Latvia, the global decentralization processes in Ukraine started to implement only in recent years.

2.2. Mobility and transportation

“Mobility means actual physical movement including walking, cycling, public transit, car and other modes of transportation.” (Ristimäki, 2010, p. 61)

There are 2 main factors impacting on usage of vehicles and travel distance: urban form and spatial structure. The optimal accessibility is usually provided for people living at densely built areas, where destinations to their workplaces, shops, services and activities are concentrated. While people, who live on the suburbanized ring, are forced to spend lot of time in traffic. The preferable transportation mode in peri-urban areas remains cars. As a result of this preference low income earners and those without cars could be excluded and segregated (Ristimäki, 2010, p. 61)

Long commuting way and air pollution emissions are the major negative effects challenging transportation system in low populated areas. Therefore, in the last few years the policy of
practically all European countries are aiming towards the usage of electric cars instead of fuel vehicles.

“Increased accessibility can be reached by improving the quality, capacity and speed of the transport system.” (Ristimäki, 2010, p. 62)

However, the increased speed of automobile-dominated transport systems leads to the dependency on car usage and creates encourages residents to settle in peripheral areas. As a result, urban sprawl splits area into less accessible fragmented areas, and make the distance to urban centers longer. (Ristimäki, 2010, p. 62)

There are two types of urban forms: monocentric and polycentric urban forms, which have a different commuting pattern. The monocentric type is an easier objective for the planning of public transportation, but at the same moment is the stimulator to car dependency and trigger to the urban sprawl. The polycentric urban modern is more integrated system of connectivity between urban cores. These connectivity helps to minimize the commuting costs by shrinking the distance between urban cores and reducing the impact on the environment. (Ristimäki, 2010, p. 62)

2.3. Recreation and tourism

“A long with their productive and ecological relevance, European landscapes account for a broad range of socio-cultural values. This includes their usage as a place for nature-focused recreation, leisure and tourism, but also as an important element for the construction of regional identity.” (Berges, Zasada; 2010, p.76)

Eastern European countries are characterized by a wide variety of cultural landscapes formed by geographical features, traditional farming, land use structures and the built-up areas. The unique features make the cultural landscape especially attractive for recreational and touristic purposes tightly interrelated with numerous relevant activities: hiking, horse riding, climbing, etc. Recreation and tourism are favoured by urban and peri-urban inhabitants for daily purposes or vacations. Peripheral zone around cities with the valuable for inhabitants green infrastructure, preferably area including services and facilities, turn to be the most perspective place of recreation purpose for urban residents. In comparison to urban core,
peri-urban area has higher environmental quality what is making this zone so attractive at the same time inducing pressure on this area. Natural features and unique geographical characteristics of the area such as waterbodies, the closeness to coastlines, specific relieves or mountains concentrate new recreational developments around these areas (Berges, Zasada; 2010, p.76)

Frequently, the decreasing of recreational attractiveness is associated with intensity of suburbanization processes. However, the increasing income and demographic change require the need for recreation: for people in the retirement years, families with children. (Berges, Zasada; 2010, p.78) Due to the improvements in transportation system and affordable prices domestic and international tourism worldwide will grow at an average rate of 4.1% a year. (European Travel Commission, 2011) International tourism become a new challenge that is necessary to be handled.

2.4. Managing growth

“To ensure sustainability in the rural-urban regions – especially in the peri-urban areas – land use changes and new developments have to be controlled, managed, or in some way coordinated by the public sector” (Tosics, Ravetz; 2010, p.80)

Tosics and Ravetz (2010, p.80) describe in their chapter how this control through the spatial planning policies and formal government, taxation systems, regulatory tools can be established. However, authors conclude that the new EU member states from Eastern Europe (Figure 8) have the weak formal government system and planning policies, which do not allow to properly control over rural-urban region processes. Tosics and Ravetz (2010, p.80) warn that the public sector is weak in all aspects and the results can be an accelerator of urban sprawl.
2.5. Urban sprawl and decentralization process

Pack, Potter and Gale (2001) indicate in their article the decentralization process of economic activity in the last several decades led to the urban sprawl and related problems in suburbs. They also describe another side of decentralization, where this process may be considered as a positive development, reflecting the human’s preferences regarding residence, employment, and other factors.

2.5.1. The correlation between urban sprawl and decentralization process in Poland

Urban sprawl is the type of development caused by people who prefer to live in suburbanized ring, where the cost of real estate is lower (Sendi, 2013). The local municipalities are not able to prevent this process and sometimes they are interested in the out-flow migration from city cores to peri-urban areas because of the tax revenues (Chmielewski, 2002).
At the same time, local governments often implement spatial policies that are not adapted to large-scale migration. The weakness of local spatial planning in Poland is primarily due to the liberalisation of spatial management in the 1990s. This legislation emphasised the protection of private property rights, giving greater freedom to building contractors and invalidating existing spatial plans. (Litynski, 2016, p.87)

The local governments often provided landowners with inaccurate plans for undeveloped areas, mostly along the major roads and even in environmental sensitive areas. The lack of understanding how to develop the proper spatial plan to control the urban expansion nowadays has led to more global problems (Lisowski 2014)

Figure 9. Urban sprawl in Poznań: a) spatial structure; (source: Google Earth)

The transformation of the spatial structure of suburban areas during decentralization processes in Poland now is more distinct than it was two decades ago. The real estate developers have strongly pushed the creation of more dispersed metropolitan. (Litynski, 2016, p.87)

There are two main groups of citizens: those, who improve their individual quality of life and those, who defend the principles of sustainable development. (Lisowski, 2014)

Litynski (2016) also proves in his article that greater urban sprawl is accompanied by lower GDP in municipalities, thus can be confirmed the relation between urban sprawl and the local economy. He notes in his study the houses should be built more compactly to attain a
higher level of the local economy and keep compactness. These implications should be taken into account by the local authorities during the planning process.

### 2.6. Land use

“Unplanned incremental urban development, characterised by a low density mix of land uses on the urban fringe” (Nilsson, 2010, p.11)

According to Nilsson (2010), the areas classified as peripheral expand four times faster than urban areas, meanwhile urban expansion will continue at 0.5-0.7% per year. Peri-urban areas are fast changing with the fragmented land use pattern.

Peri-urban areas exhibit throughout Europe very different characteristics regarding spatial structure and density of the different land uses, ranging from continuous low-density urban fabric, to scattered medium density settlements and commercial sites; from dense horticultural areas to arable land, to forests and natural areas. (Tosics, Nilsson; 2010, p. 22)

![Figure 10](image_url)

**Figure 10.** Regions in the eU-27 with an above average share of urban, peri-urban and rural areas (Source: ZALF, AIT)

Rural-urban region, as was described above, contains certain mix of urban, peri-urban and rural areas. Figure 10 identifies rural-urban regions with an above average share of each of these areas. (Loibl, Piorr, Ravetz; 2010, p.29) The results show the “hot spot” regions of peri-urban...
urban land use. However, Latvia is not mentioned as a country of concentration peri-urban patterns, but country of Eastern Europe, such as Poland was listed.
3. METHODOLOGY

The methodology was based on investigating processes that trigger peri-urban expansion, exploring fields that affect these processes and are affected and defining pattern of urban sprawl by taking two case studies. The process is divided into three phases and each phase is the source for the next one.

As was mentioned in previous chapters, urban sprawl is a worldwide phenomenon that actively manifested in the last few decades. Therefore, the enormous number of researches has been done that characterizes and measures sprawl. Phase 1 is the analysis of case study cities: its population tendencies, sectors of employment, urban forms, recreational resources and land use maps. For that, were processed data regarding each case study city that deals with spatial development. Phase 1 explores particularly statistical data. The land use maps were explored to detect the active and progressive sprawling areas. Therefore were selected four peri-urban areas in both case studies for further evaluation. The necessary data was received from Land Monitoring Service “Copernicus” in case study Riga (Latvia) and from Department of Architecture and Urban Planning of LODA in case study Lviv (Ukraine).

In each case study were selected two areas that are likely sprawling due to the analysis of land use maps in Phase 1. In Phase 2 was applied detailed map analysis. Due to the Google Earth Pro Maps timelapse were compared maps with the differences in 10 and 15 years, according to the selected area, to estimate the surfaces’ changes happened during that time. New built-up areas were marked with the blue dots mostly representing housing and red lines representing new constructed roads. New settlements were colored in the light-red cover and existing village structure in the orange cover.

Phase 2 of this research applies as well an approach of urban sprawl assessment proposed by Galster (2001) based on qualitative technique. Due to the achieved map analysis, the evaluation was done by the certain indicators, such as: density, continuity, concentration, clustering and centrality. This method helped to evaluate the degree of urban sprawl, find similarities and differences that is crucial during the comparing process.

Phase 3 deals with the comparison of four selected areas due to the achieved data from Phase 2 and was guided by the statistical data from Phase 1.
4. RESULTS

4.1. Case studies Lviv, Ukraine and Riga, Latvia

Lviv and Riga for few decades belonged to communist cities with the valuable historical cores, strategical positions and unique natural environments. For both countries Ukraine and Latvia, these cities remain to be the main economic engines experiencing constant spatial changes.

In the end of 20th century in Western Ukraine was observed the tendency towards of the rapid urbanization of rural areas and the transit from agriculture sector to commercial and professional, scientific and technical activity sectors, thus new mid-size cities unexpectedly have appeared. Lviv has a strategic layout for Ukraine, because of the proximity to Ukrainian-Polish border. In addition, it has well-developed infrastructure connectives with Europe and belongs to the seven largest cities of Ukraine. Lviv is the cultural center of Ukraine with the largest preserved valuable historical core. Since Ukraine regained its independency, Lviv became the most successful touristic place in the whole country and since football championship – Europe-2012 has hosted people from all over the world. These facts have an impact on the formation of recreational facilities within and outside the city and on the economic sectors as well. Lviv Region characterizes as the area rich on natural resources, such as natural mineral water, unique reliefs and mountains. However, simultaneously it is lacking on waterbodies within the city. After the sinking down of Poltva river under the city ground, Lviv experienced the natural draining of major lakes, ponds, etc. In the last decades, these consequences led to the constant trips of residents to the urban periphery in order to come closer to natural water resources. New infrastructure and recreational facilities made these trips more convenient and regular.

After joining Latvia to the EU in 2004 many economic, social and political changes occurred. Riga is the largest city in Latvia and Baltic States. It is an international transport hub carrying out the sea trade. Moreover, Riga has the biggest job market in Latvia and is considered by the citizens as “place of opportunities”. This fact triggers city’s expansion and
brings changes in social structure. Riga has the rich natural resources, especially water resources such as lakes, rivers and access to Baltic Sea. Economic boom in 2000’s and the growth of citizen’s welfare affected human preferences and expanded possibilities in the issue of housing.

As most of the former communist cites, Lviv and Riga undertake the population decline, but in contrast to the majority continue to be powerful economic and cultural centers.

4.2. Population tendency

4.2.1. Case study Lviv, Ukraine

![Lviv Population History Chart](Image)

**Figure 11.** Lviv: Population history in thousands (Source: Population, Lviv)

In 2016, the population size of Lviv was estimated 728,350 (Figure 11) and the population decline regarding 1171: 332 - natural decrease and 839 – out-migration.

Although the number of out-migrations is considerable, the number of in-migration increases with the rapid pace. Over the last few years since the beginning of war in eastern Ukraine and Crimea annexation over 800,000 refugees have been settled out of their household. Since the spring, 2014 until nowadays few waves of migration experience the largest Ukrainian cities. Big share of them concentrated in Lviv Region, because of the Ukrainian-asylum, EU-
asylum, job opportunities and further migration to EU. Significant part of refugees is elderly people. Lack of effective governing methods applied in economy and real estate sector have pushed country to the new housing boom. However, part of refuges are not officially registered yet and it makes difficult to estimate real number of newcomers.

4.2.2. Case study Riga, Latvia

Janson indicates in his work (Jansons, 2011, p. 48) the population number in Riga that was 731 762 in 2005, but since 1995 the agglomeration has increased by 974.6 (+14%) and the number of inhabitants increased only by +1.5% and was 16 419. Due to the suburbanization processes, the suburbanized ring has significantly increased in population (Figure 12) since 1995. This fact leads to the assumption that city is sprawling.

Also, one of the main reason of it was a local migration and the negative natural increase rate. Mostly, new residential areas were spread out in suburb zones around urban core along main roads. Real estate developers prefer to build one or two story buildings rather than multi-story apartment houses, manufacturing, and office buildings. (Jansons, 2011, p. 48)

According to the analysis of planning documents (Jansons, 2011, p. 49) collected by the author, this papers give a vision of how 12 suburb municipalities in Riga Region (Ķekava, Daugmale, Baloži, Babīte, Salas, Carnikava, Stopini, Mārupe, Garkalne, Olaine, Salaspils) see their future. The analysis shows that all of these municipalities expect a continuous population growth, but no detailed principles of how this population growth develop were provided. These local municipalities are planning to enlarge borders of current villages and build up there low-rise residential buildings. There is no strict definition in Latvian law of the village development vision, thus the developers aiming to gain higher profit can misuse it. (Jansons, 2011, p. 49)
Figure 12. Population change in Riga agglomeration (Source: Pužulis, Kūle)

The new strategical Riga Region spatial development programme describe desirable spatial development of current villages. The policy is targeted to redevelop existing seasonal buildings to permanent housing, new housing development should be continuous and concentrated with well-developed inner network of roads. New functions will dilute the homogeneous peri-urban fabric. (Figure 13)
<table>
<thead>
<tr>
<th>Planning document</th>
<th>Population changes</th>
<th>Spatial vision</th>
<th>Characteristics of planned building</th>
<th>Economic activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Development programme of Ķekava parish 2008-2020</td>
<td>+</td>
<td>Develop and expand current villages  Develop inner network of roads and streets</td>
<td>Low-rise residential building  Single-family residential building</td>
<td>Tourism (active, business, recreational)  Transport and logistics, food manufacturing and services</td>
</tr>
<tr>
<td>Land use plan of Balotl town 2008-2020</td>
<td>+</td>
<td>Transformation of seasonal residential building to permanent residential usage  Location of residential building in areas provided in land use plan</td>
<td>Low-rise residential building  High-rise residential building</td>
<td>Services (hotels, cafes &amp; restaurants, auto repairs &amp; mechanics)  Tourism</td>
</tr>
<tr>
<td>Development programme of Babite parish 2007-2019</td>
<td>+</td>
<td>Spatial structure of mosaic and interaction with green areas</td>
<td>Single-family residential building</td>
<td>Food manufacturing, business tourism, logistics</td>
</tr>
<tr>
<td>Development programme of Cēnēkava district 2009-2014</td>
<td>+</td>
<td>Transformation of seasonal residential building to permanent residential usage</td>
<td>Low-rise residential building  Single-family residential building</td>
<td>Tourism, woodworking</td>
</tr>
<tr>
<td>Development programme of Čepene district 2003-2015</td>
<td>+</td>
<td>Convergence of villages creating continuous concentrated residential building</td>
<td>Single-family residential building</td>
<td>Woodworking, tourism, agriculture</td>
</tr>
<tr>
<td>Development programme of Mārupe parish 2003-2014</td>
<td>+</td>
<td>New areas for single-family residential building</td>
<td>Single-family residential building  Smallholder territory  Commercial territory</td>
<td>Intensive agriculture, tourism (active, rural, business), High-technology manufacturing near Riga Airport</td>
</tr>
<tr>
<td>Spatial development strategy of Garkalne district 2008-2030</td>
<td>+</td>
<td>Concentrated building along current villages and main roads</td>
<td>Low-rise residential building  Single-family residential building</td>
<td>High-technology manufacturing</td>
</tr>
<tr>
<td>Land use plan of Salaspils district 2002-2012</td>
<td>-</td>
<td>Development of single-family residential building</td>
<td>Single-family residential building</td>
<td>High-technology manufacturing, rural tourism, logistics, quarrying, building material manufacturing</td>
</tr>
</tbody>
</table>

**Figure 13. Spatial vision (Source: Development Programme of Riga for 2014-2020)**
4.3. Sectors of employment

4.3.1. Case study Lviv, Ukraine

This diagram (Figure 14) reveals the main sectors of employment in Lviv Region. Despite the fact that the region has changed the share of employment industries since the independence, but it still has the big share in agriculture industry. However, severe problems with exporting products abroad have significantly affected the land use in rural-urban region. Also, here can be observed that the real estate has weighty position in employment industries.

Figure 14. Sectors of employment in Lviv (Resource: Strategy of Lviv Region Development. 2020)
4.3.2. Case study Riga, Latvia

Figure 15. Sectors of employment in Riga (Resource: Development Programme of Riga for 2014-2020)

Riga’s economy suffered for a while after the regaining its independence in 1990’s from inflation. But soon after the shift towards market economy, city’s economy slowly has been recovered.

In Riga Region, trade industry as well as transport and logistics are the key sectors that showed the recovery process in early 1990s. (Figure 15)

Moreover, industries in Riga successfully are engaged in machine building, metalworking, shipbuilding and repair, textiles, woodworking and food processing. Manufacturing industries include diesel engines, streetcars, chemicals, pharmaceuticals, furniture, electrical apparatus, radio and telephone equipment, meteorological instruments, printing and publishing, textiles, building materials, and paper, etc. (The Columbia Electronic Encyclopedia, 2007)
4.4. Existing urban forms and transport infrastructure

Following the car ownership rates in Europe the lowest are in east European countries, particularly in Ukraine and Latvia. However, annually this number increase at rapid pace.

In order to reduce car dependency in the periphery, both cities should be provided with the environmental-friendly sustainable public transport systems in these fragmented areas that ensure adequate accessibility for all social groups in sprawling areas as well as a proper public transport within dense urban cores and between them.

4.4.1. Case study Lviv, Ukraine

![Transport infrastructure in Lviv, Ukraine](Resource: Mistoproekt)

**Figure 16.** Transport infrastructure in Lviv, Ukraine (Resource: Mistoproekt)
Weak planning with a rapid growth leads to uncontrolled relocation of activities and suburbanization. Employment relocates from the center to the suburbs and peri-urban areas. Figure 10 depicts that the Lviv is still monocentric city with an incompletely formed agglomeration around it. Real estate development and the powerful inflow of people from Eastern Ukraine have already severely affected suburb structure.

Lack of sustainable public transport system within urban core is the provoker of car dependency, as a result cause the spread of settlements along major roads in Lviv Region (Figure 16). Nowadays, it is strategically important to provide proper spatial planning, sustainable public transport system for city residents and for residents of peri-urban areas, since these basic needs predetermine the sustainability of rural-urban region.

Ristimäki (2010) claims that environmentally sustainable peri-urban transportation can be achieved by: 1) reducing the need to travel; 2) increasing the share of non-motorised and public transport; 3) improving vehicles. Sustainable transport system supports multiple transportation choice and provide equal accessibility for all social groups. The author’s statement could be considered as an essential objective during the spatial planning process in Lviv Region.

4.4.2. Case study Riga, Latvia

The main urban core is defined by a railway ring and according to Figure 17, Riga Region has also monocentric urban form. Suburb zone is characterised by a combination of micro districts.

Figure 17. Spatial structure of the city (Resource: Development Programme of Riga for 2014-2020)
Figure 18. Divisions of transport flow (Resource: Development Programme of Riga for 2014-2020)

Sustainable Development Strategy of Riga propose the system, where the biggest share of private cares will be used in the periphery up to the suburb circle (Figure 18) marked with a thick red line. Then a bit smaller share will have suburb area up to the city core. And considerably small share will be within city core. This principle anticipates the installation of the medium-term parking network around the city circle and the short-term parking around the central circle that is connected with public transport system. (Development Programme of Riga for 2014-2020, 2014, p.20)

Also, this programme anticipates the mobility principle in the city core that will include several mobility modes (Figure 19), such as walking, cycling in combination with the motorized modes: buses, trams and cars.

Figure 19. Divisions of transport flow (Resource: Development Programme of Riga for 2014-2020)
4.5. Recreation

4.5.1. Case study Lviv, Ukraine

Figure 20. Low density settlements nearby Vulky lake. Case study Lviv (Source: author)

Figure 14 depicts the formation of a new settlement nearby the city boundaries, mainly caused by the closeness to waterbody and new facilities and services for recreational purpose that are provided in proximity. The problems with water management system and lack of water bodies within the city, make this “oasis” attractive for urban residents. (Figure 20)
Figure 21. Vynnyky lake. Lviv Region (Source: Google Images)

On the Image can be seen the popular recreational area near Vynnyky Lake in the summer time. High quality environment, purified water, new infrastructure and facilities made this place more attractive and accessible than ever before. (Figure 21)

Figure 22. The most often used transportation modes for domestic tourism. Case study Lviv (Source: Strategy of Lviv Region Development. 2020)

Rapid transportation modes and its combination also define the touristic inflow. The dominated transportation mode for long distances overall in Europe became flying airplanes and buses. Nevertheless, the prior transport frequently used by tourists to travel to Lviv until now is the train (Figure 22). Because of the size of the country and political domination, the
national company “Ukrzaliznyts’a” remains monopolist. Nevertheless, Ukrainians still consider train as the most affordable and convenient transport. However, the tendency in the last years has shown that after entering low costs airlines companies this tendency may significantly change.

Because of the war and complicated situation in eastern Ukraine, western cities of Ukraine cut down the number of visitors from European countries, particularly this situation concerns Lviv and Lviv Region. Mostly domestic migration forms the pattern of recreational structure and the changes of the infrastructure pattern.

4.5.2. Case study Riga, Latvia

Figure 23. Low density settlements nearby Lielais Baltezers. Case study Riga (Source: author)

The good example of recreation development and formation of new settlement in peri-urban area can be followed in Riga nearby Lielais Baltezers (Figure 23, 24) that is the one of the major lakes in Latvia. Nowadays, the surrounding area turned into cottage settlement. Jansons (2011, p.49) describes in his analysis that suburban municipalities in Riga Region consider tourism as the main commercial activity, although there are no documents that provide clear vision of how to handle it.
However, the recreation and tourism remain one of the major branch of city income for both case study cities, but the lack of management and weak spatial planning may heavily decrease income in other sectors.

![Bukulti village, nearby Lielais Baltezers. Case study Riga, Latvia (Google Image)](image)

**Figure 24.** Bukulti village, nearby Lielais Baltezers. Case study Riga, Latvia (Google Image)

### 4.6. Land use

#### 4.6.1. Case study Lviv, Ukraine

![Land use map of Lviv (Source: Mistroprojekt)](image)

**Figure 25.** Land use map of Lviv (Source: Mistroprojekt)
Merging of existing villages and small towns around the city and the formation of new economically independent territorial unites will become a new challenge for city and local authorities during the spatial planning process. Villages such as Malekhiv, Lysynychi, Sknyliv, etc became targets for middle-class people to settle in. Regarding to the land use map (Figure 20) the patches of urban fabric are stretching around the mono-centric urban form.

Because of the uniqueness of steep relief that surround urban area, these zones are not so attractive for real estate developers. This natural feature gave the chance for the city to preserve a big share of greenery.

The boundaries of Lviv were not significantly changed since the collapse of USSR. It seems that despite the fact that Lviv has only 730 212 in 2017, it suffers from the rapid in and out – migrations, which cause severe changes in the urban and peri-urban pattern. As well as in the case study Riga the reason of changing the peri-urban fabric is the well-developed existing infrastructure: railroads and major roads between cities. Another reason of emerging settlements is the recreational areas within Lviv Region that trigger the formation of new and reinforcing existing infrastructure. The good examples are the enlarged settlements nearby lakes - Navaria or Lysynychi (Figure 25). Significant push towards discontinuous urban fabric gave the development of the stadium to Euro-2012 (Figure 26, 27) and new shopping mall on the city’s edge along the E471 road. During the soviet time, Solonka village was the summerhouse settlement, but in recent years new rapid city development, real-estate boom and weak planning caused the emergence of discontinuous urban pattern (Image) outside the city boundaries. Another reason that might provoke urban sprawl in few years in Lviv Region is the decentralization processes.

**Figure 26.** New housing in proximity to Arena Lviv (Google Image)
4.6.2. Case study Riga, Latvia

This map reveals the share of continuous and discontinuous urban fabric and construction sites in peri-urban area. Figure 28 shows that the huge share of it stretches along the coastline and the major road A10 that connects Riga and Jurmala. Another pattern we can follow is
the one that leads to the airport and Marupe village. The railroad is also another facilitator towards discontinuous urban fabric in southern eastern and eastern part of Riga planning region. Another reason of spreading settlements nearby the city boundary is a well-developed infrastructure, roads that connect Sigulda and Jelgava. (Figure 29) Closeness towards more ecological clean environment can be a crucial factor influencing the peri-urban pattern. It is noticeable that the derivation of new private single house area such as Bukulti was aroused by the closeness to Lielais Baltezers lake and cleaner environment.

Figure 29. City boundaries (Source: Development Programme of Riga for 2014-2020)

Following the land use map depicted above railroad and motorways are the main provokers of sprawl in periphery.

According to European Environment Agency, the drivers of land-use changes are economical factors. Different periods of unexpected economic growth have reflected on the formation of urban sprawl, country out-migration and domestic migration. In soviet society
people who engaged in agricultural fields and lived in rural areas were considered as a lower social class.

Therefore, today agricultural sector undergoes economic stagnation and land abandonment, meanwhile former agricultural lands and natural areas transform into built-up areas. (European Environment Agency, 2015)

“Drivers that are of great importance but sometimes also have an opposite effect are policy drivers such as the EU’s direct payments. On the one hand, direct payments for maintaining agricultural land in good condition help to discourage land abandonment and other processes. Yet on the other hand, they also support afforestation. Thus, changes are being made to the landscape and land use anyway. Due to the low price of agricultural and forest land, there is a tendency to purchase land for deforestation, without undertaking any real agricultural activities to sustain it.” (European Environment Agency, 2015)

Economic crisis provokes actions in agriculture sector targeted to generate new sort of income due to the arable lands depletion.
4.7. Analysis of urban sprawl. Case study Lviv, Ukraine

Figure 30. Case study Lviv (Source: Google maps)

Figure 25 depicts two chosen settlements nearby the city boundary and major motorways that were suspected to sprawl: Palanky and Solonka. Due to the Google Earth Pro maps from 2002, 2005 until 2016 (Figure 31, Figure 32, Figure 35, Figure 36) were analysed these settlements to define patterns of new built-up areas, anticipate future challenges and understand humans preferences.
4.7.1. Case study Lviv, Ukraine. Village Palanky

Figure 31. Case study Lviv.Village Palanky 2007 (Source: Google Earth Pro)

Figure 32. Case study Lviv.Village Palanky 2015 (Source: Google Earth Pro)
According to the Figure 33, new built-up areas are mostly represented as single-family houses. However, along the main ring road are located manufacturing and recreational buildings, as well as services: such as car repair and petrol stations. New built-up areas frequently appear within the village boundary that can be related to the migration issues. Lots of people from rural areas suffer from the lack of work and decent wage that cause out-migrations to the EU, considerably to Poland. This “a low-educated labour” financially supports their families, who stay in the village areas. The higher income gives an opportunity to turn old houses into villas or just into the buildings extended in height. Another essential aspect of appearing new built-up areas within the village is the social issue. In contrast to urban residents moving to rural areas, social interaction between neighbors are more important for rural residents. Urban residents, in their turn, tend to settle down separately from the village settlements, closer to the infrastructure and other facilities. New settlements nearby Palanky village are highlighted with the red bubble are characterized by the low density in developable land, low continuity, deconcentrated pattern, clustered and decentralized development.
<table>
<thead>
<tr>
<th>Palanky, Lviv Region, Ukraine</th>
<th>Characteristics</th>
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<tbody>
<tr>
<td>low density</td>
<td>high density</td>
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<td>low continuity</td>
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<td>unclustered</td>
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<td>centralization</td>
<td>decentralization</td>
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**Figure 34.** Assessment of urban sprawl. Village Palanky (Source: author)

**Figure 35.** Palanky Village (Resource: Google Maps)
4.7.2. Case study Lviv, Ukraine. Village Solonka

Figure 36. Case study Lviv. Village Solonka 2005 (Source: Google Earth Pro)

Figure 37. Case study Lviv. Village Solonka 2015 (Source: Google Earth Pro)
The map above (Figure 38) depicts an expansion of village covered in the past with summer houses that were transformed or rebuild into the simple single family houses. This tendency has started since the collapse of Soviet Union and lasts until today. The major provokers of this development are the new shopping mall and the stadium “Arena Lviv” nearby the road intersection. In comparison to Palanky village, the pattern of new settlements nearby Solonka village differs in high continuity and new developed road infrastructure. Here is barely can be traced new development within current village boundaries, while the developable land was mostly utilized. These new settlements have single use – residential, however new single buildings along main motorways differ in its function.

The low density in developable land, deconcentrated pattern, clustered and decentralized development could characterize new built-up areas, but as opposed to built-up areas nearby village Palanky have low continuity.
<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Palanky, Lviv Region, Ukraine</th>
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<tr>
<td>low density</td>
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<td>centralization</td>
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**Figure 39.** Assessment of urban sprawl. Village Solonka (Source: author)

**Figure 40.** Solonka Village (Resource: Google Image)
4.8. Analysis of urban sprawl. Case study Riga, Latvia

Figure 41. Case study Riga (Source: Google maps)

Figure 39 depicts two chosen settlements nearby the city boundary and major motorways that were suspected to sprawl: Marupe and Katlakalns. Due to the Google Earth Pro maps from 2002 until 2016 (Figure 40, Figure 41, Figure 44, Figure 45) were analysed these settlements to define patterns of new built-up areas, anticipate future challenges and understand humans preferences.

**Figure 42.** Case study Riga. Municipality Marupe 2002 (Source: Google maps)

**Figure 43.** Case study Riga. Municipality Marupe 2016 (Source: Google maps)
Marpupe is one of the biggest Latvian municipalities that noticeably changed its structure during the last 14 years. Severely fragmented former agricultural land now turned into the large-scale low-rise residential development. As well as in Solonka village, the pattern is expressed as an attached residential development to the existing village structure. However, in contrast to Solonka village, it has more dispersed pattern and discontinuous spatial growth along major motorway heading to the city core. New shipping and manufacturing companies took the position as close as it's possible to the motorway. The same principle is applied in sprawling areas around Lviv city. From the Figure can be seen that water resources are considered as an valuable place to live nearby. Large-scale cottage settlement around the lake is profitable housing estate development with relatively lower land prices in comparison to the suburban land.

Municipality Marupe can be characterized as low density, high continuity, clustered and decentralized area with the deconcentrated pattern of built-up neighborhoods. (Figure 42)
<table>
<thead>
<tr>
<th>Municipality Marupe, Riga Region, Latvia</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>low density</td>
<td>high density</td>
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<td>+</td>
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<td>low continuity</td>
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<td>centralization</td>
<td>decentralization</td>
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</table>

**Figure 45.** Assessment of urban sprawl. Municipality Marupe (Source: Google maps)

**Figure 46.** Aerial view of Marupe Municipality (Source: Google Images)

**Figure 47.** Case study Riga. Municipality Katlakalns 2002 (Source: Google maps)

**Figure 48.** Case study Riga. Municipality Katlakalns 2016 (Source: Google maps)
In 2002, the loop road in northern-eastern part (Figure) has connected Ziedonis village with the main motorway heading to the city, in recent years turned to be the main cause of dispersed housing development in the middle between river and motorway. In comparison to the pattern of Marupe Municipality, this chaotic pattern has no any logical connectivity with the existing villages and clearly stands out as a deconcentrated development. The big share of new roads forming dense network emerged just in few years and has no proper structure.

Municipality Katlakalns can be characterized as low density, low continuity, clustered and decentralized area with the deconcentrated pattern of built-up neighbourhoods. (Figure 46)
### Municipality Katlakalns, Riga Region, Latvia

<table>
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<tr>
<th>Characteristic</th>
<th>Characteristics</th>
</tr>
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<tbody>
<tr>
<td>Low density</td>
<td>High density</td>
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<tr>
<td>Low continuity</td>
<td>High continuity</td>
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<tr>
<td>Concentrated</td>
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<td>Clustered</td>
<td>Unclustered</td>
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<tr>
<td>Centralization</td>
<td>Decentralization</td>
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</table>

**Figure 50.** Assessment of urban sprawl. Municipality Katlakalns (Source: Google maps)

**Figure 51.** Aerial view of Katlakalns Municipality (Source: Google Images)
4.9. Urban sprawl characteristics in each selected area

Figure 52. Urban sprawl assessment (Source: author)

The results showed the difference between the urban sprawl patterns in two case study cities due to the evaluation of certain criteria such as density, continuity, concentration, clustering and centralization. Most of analyzed areas have shown low density, high continuity, decentralization, deconcentrated and clustered pattern. Palanky village in Lviv Region showed the most significant differences from the rest analyzed areas. However, the boundaries of existing village has not changed principally, the big share of old houses and abandoned plots
were redeveloped or rebuild into the single-family houses. Only a small share of clustered new housing with the recreational and residential purposes was detected. The rest analyzed areas showed new added built-up areas to the general village structures. Moreover, Palanky village showed low continuity that differs this area from the rest as well.

Both case study cities showed that manufactures and recreational development tend to concentrate along major roads or motorways. New roads’ infrastructure along rows of private houses appears unpredictably and has now proper structure. Waterbodies and valuable nature are the magnets that gravitate new low-density housing developments.
5. DISCUSSION

The goal of this research was to learn about the current spatial processes that are taking place in the peri-urban areas in Lviv and Riga Regions, to define sprawling patterns and causes of urban sprawl and anticipate future challenges of rural-urban regions.

The detailed analysis of case studies helped to get fundamental knowledge about dynamics of the peri-urban in these regions, such as population tendencies, sectors of employment, urban forms and transport infrastructure, recreation and land use. The case study Lviv showed the constant changes of residents’ number and unpredictability of domestic migration caused by the conflict situation in the Eastern Ukraine, while the population data in case study Riga is defined. In case study Lviv, it gives an opportunity for real estate developers to develop new housing without certain limitations regarding population changes. The exploration of land use maps revealed that the uniqueness of the environment and relief in case study Lviv gave some limitations for new housing developments in the region, while the unique natural places in case study Riga gravitate new developments.

The map analysis of four areas: Palanky village, Solonka village, Marupe municipality, Katlakalns municipality in two case studies confirmed that these areas are sprawling in certain degree. Palanky village showed the low continuity of new settlements in comparison to the rest of analyzed areas. The spatial processes in the area mostly relate to the redevelopment of old houses into the new single-family houses while the big share of rural residents work abroad and transfer savings back home to support their families. Only a little share of new clustered settlements constructed beyond the village structure. However, another selected area in case study Lviv – Solonka village showed the similar tendency of the redevelopment, as was described above, it also showed a great share of attached new housing. In comparison to Palanky village, the share of new roads in Solonka village is considerably higher. The selected areas in case study Riga manifest more intensive pattern of housing development and the biggest share of newly constructed roads. Both Marupe and Katlakalns municipalities did not reveal the similar redevelopment processes within the villages’ boundaries as in case study Lviv, but demonstrated more deconcentrated pattern of new settlements that chaotically dispersed in the developable land.
In most cases, topics that were brought out in the literature review are relevant to the results achieved from analysis. However, as was mentioned above, the unique relief in case study Lviv turned to be more limitation for new development within this environment, but it has the same gravitation principle around it.
CONCLUSIONS

In Eastern Europe after the collapse of communist regimes, new processes pertaining spatial development took place. Population decline, aging tendency, out-migrations are the major characteristics of two post-soviet countries: Ukraine and Latvia. However, the number of population decrease, new built-up areas spread with the rapid pace in peri-urban. These factors are the main evidence of urban sprawl in these countries. It is important to remember about this strong relationship between the population decline and urban sprawl, while the new housing developments are taking place in 2 case studies unproportionally fast to the redevelopment processes of existing urban fabric.

Out-migration process is strongly reflected on the peri-urban structure, particularly in case study Lviv, where annually a big share of rural population migrate to the EU seeking higher wages. Higher income gives an opportunity for people to restructure their housing, thus increasing amount of built-up areas.

The structural changes of households severely affected preferences of residents. Young families tend to settle separately from their parents and to live in households on average with two people. The constant growth of income makes these preferences feasible to implement, thus triggering urban expansion.

Weak planning with a rapid growth caused the uncontrolled relocation of activities and peri-urbanization in case studies. Therefore, it is vital to define clear vision of how should look the structure of villages and to avoid blurred statements. Significant improvements of the public transportation systems for city residents and peri-urban residents should be considered as essentials.

The map analyses showed that all chosen areas in case studies are sprawling, but in different degrees and have more or less similar characteristics. Based on the graphical maps, density of each area is low, new urban settlements spread disproportionally indicating the deconcentrated pattern, most of new housing are tightly bunched to each other and all areas are characterized by deconcentration. However, three of four chosen areas showed high continuity, Palanky village showed considerable low continuity of new settlements.
Accordingly, many negative impacts such as high level of land consumption and land fragmentation may affect the economic sectors of both countries in the near future, such as agriculture, transport, etc. The small patches of open landscapes are the results of the fragmentation. Many arable lands are turning into the low density settlements, thus causing irreversible changes into the land structure and affecting agriculture, which still remains one of the main sectors of economy in case study Lviv. The fragmentation process also increases the demand for new roads, thus requiring constant capital inflow from the budget for the construction and maintenance of transport infrastructure. This issue mostly concerns case study Latvia that is different from case study Lviv in the higher amount of new roads constructed during the last fourteen years.

The most distinguished features, triggering urban sprawl in case study Lviv, are the unpredictability of domestic migration, caused by the political instability and war in the eastern part of the country and the indefinite number of newcomers allows real estate developers build up new housing without any limitations. While the data in case study Riga is more or less predictable.

It is important to be highly aware of the processes that have been happening during last decades concerning spatial development during spatial planning and the application of regulatory tools to manage peri-urban growth.
**KOKKUVÕTE**


Väljarände protsessid on tugevalt mõjutanud linnaäärsed struktuure, eelkõige Lvivis, kus iga-aastaselt suur osa linnas väljas elavast elanikkonnast migreeruvad kõrgemate palkade otsingul Euroopa Liitu. Suurem sissetulek võimaldab inimestel ümber ehitada enda kodude, suurendades seega täis ehitatud alade hulka.


Nõrk planeerimine koos kiire kasvuga on põhjustanud mõlema uuritava linnapiirkonna kontrollimatu tegevuse ümberpaikanemise linnaäärssetes aladel. Seega on elutähtis defineerida selge visioon kuidas külade struktuur peaks välja nägema ning vältida ebaselgeid väiteid. Linnade ja linnaäärssete alade elanike huviväiks on vaja teha märgata vaid täiustust ühistranspordi süsteemis.

Kaardianalüüsid näitavad, et kõik juhtumuuringu alad on laienemas, seda erinevates astmetes aga omavad üldjoontes sarnaseid tunnusmoodi. Kaartide põhjal saab öelda, et hoonestustihedus on kõikidele aladel madal, uuselamute alad laienevad eba-proportsionaalselt, mis väljendub laiali valgunud asustusmustrina, enamus uuselamu rajoone on üksteise kõrval paigutatud ja kiiki alasid iseloomustab hajus asustustihedus. Kuigi kolmel alal
neljast on märgata tugevat jätkuvust näitas Palanky küla märgatavalt madalat uusarenduste jätkuvust.

Sellest tulenevalt võivad mitmed negatiivsed mõjutusid, nagu näiteks, maade laiaulatuslik tarbimine ja maade killustumine, mõjutada lähitulevikus mõlema maa majanduslikku sektorit, näiteks põllumajandust ja transporti.

Vaikselt laigu unistat maastikuga on killemine tulem. Paljud põllumajandus maad muutuvad haja asustusega aladeks, mis muudavad maastiku struktuuri pöördumatult, mõjutades põllumajandust, mis on siiani uks põhilisi majanduslikku Lvivi juhtumi puhul. Fragmenteerumise protsessid, samuti vajadus uute teede järele, mis vajab pidevat finantsi, et hoida antud taristut üleval.

See puudutab eelkõige Lätit kus teid on viimasel 14 aastal suures mahus juurde ehitatud. Köige tuntum eripära, mis põhjustab Lvivi valglinnastumist on riigisisene ettearvamatu migratsioon, mis on põhjustatud poliitilisest ebastabiilsusest ja riigi ida poolses osas toimuvast sojast, lõpule hulk uusi elanikke võimaldab arendada kinnisvara piiramatult. Riia puhul on arendusmahud üldiselt ennustatavad.

Äärmiselt oluline on olla teadlik antud ruumilise arengu protsessist, mis on toimunud juba viimased aasta kümnendid, vaja on reguleerida erinevate vötetegevused ruumilist arengut, et hallata linnaaäärsete alade edasist arengut.
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Appendix 1. Infographic. Comparison of statistical data regarding peri-urbanization in Lviv, Ukraine and Riga, Latvia
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