GODINA XIX BROJ 24

UNIVERZITET U BEOGRADU
GEOGRAFSKI FAKULTET

PROSTOR

LIST STUDENATA PROSTORNOG PLANIRANJA

SPECIAL ISSUE:

Workshops in Slovenia and Serbia

"FUTURE DEVELOPMENT VISION OF LJUBLJANA AND BELGRADE URBAN REGION"

ISSN 1451-4931

BEOGRAD, 2020.

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GEOGRAPHY

Univerza v Ljubljani
Fakulteta za gradbeništvo
in geodezijo

PROSTOR br. 24
List studenata prostornog planiranja

Posebno izdanje/Special issue:
"FUTURE DEVELOPMENT VISION OF LJUBLJANA AND BELGRADE URBAN REGION"
Workshops in Slovenia and Serbia

Izdavač/Publisher:
Univerzitet u Beogradu - Geografski fakultet
Studentski trg 3/III, 11000 Beograd
e-mail: dekanat@gef.bg.ac.rs

Za izdavača/For publisher:
Prof. Dejan Filipović, Ph.D., dekan/Dean

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Branko Protić, M.Sc.

Tehnička priprema i dizajn korica/Layout and cover design:
Branko Protić

Štampa/Print:
"Grafika Galeb", Niš

Tiraž/Circulation:
200

PROSTOR izlazi polugodišnje./PROSTOR is issued semi-annually.

Štampano sredstvima/Printing financed by
Univerzitet u Beogradu - Geografski fakultet/
University of Belgrade - Faculty of Geography

Beograd, maj 2020./Belgrade, May 2020

PREFACE

My first contact with Belgrade and its spatial planning (geographic) school occurred in 2008 and 2009. At that time, I became familiar with the spatial-planning tradition at the Faculty of Geography University of Belgrade on one hand and the development factors and challenges of Belgrade on the other. All was in the context of a bilateral project entitled "The role of strategic planning, EU comparative data and GIS for spatial development of Central European cities: the case of Ljubljana and Belgrade", agreed between the Department of Geography Faculty of Arts University of Ljubljana and Faculty of Geography University of Belgrade. The collaboration resulted in an extensive monography "Challenges of Spatial Development of Ljubljana and Belgrade" (2010; edited by Krevs, Djordjevic and Pichler-Milanovic), which showed that Ljubljana and Belgrade were not "too different to be compared", as written by the Preface author (Krevs, 2010: 7).

A decade later, I was delighted to participate in a new similar story, this time linking the spatial-planning school of the Faculty of Civil and Geodetic Engineering from the University of Ljubljana and the Faculty of Geography from the University of Belgrade. The summer semester of the 2018/2019 academic year brought the realization of the interest of colleagues from both organizations to establish a more lasting cooperation in the professional, pedagogical and scientific field. Lecturers from both faculties agreed to organize and conduct an international student workshop to address the current state in the development and spatial processes in Ljubljana and Belgrade, and to focus on the development visions of both urban regions. Faculty of Civil and Geodetic Engineering from Ljubljana contributed students of the 2nd year of the second-cycle study program Spatial Planning (subject Regional Spatial Planning), while Faculty of Geography from Belgrade contributed students of Master studies of Spatial Planning.

Under the supervision of their lecturers (Ljubljana: dr. Mojca Foški, dr. Alma Zavodnik Lamovšek; Belgrade: dr. Velimir Šećerov, dr. Dejan Filipović, dr. Dragutin Tošić, dr. Branka Tošić, dr. Bogdan Lukić), students from both faculties have acquired important competences in the strategic regional spatial planning. The study approach followed the visioneering approach developed and implemented in the Poly5 international interdisciplinary student workshop in 2015. It included the analytical phase, the evaluation of the development processes, the definition of the priority goals, formulation of a vision and measures for its achievement, as well as addressing the question of the involvement of relevant stakeholders. In 2018, Ljubljana students visited Belgrade in April 15 and 16, while Belgrade students visited Ljubljana in May 30 and 31. Visits enabled easier evaluation of the development processes and lessons learned from the hometowns and regions. These were then compared with the spatial and developmental conditions, challenges as well as the potentials from their counterparts. In some cases, these are related due to the similar spatial aspects of the market economic systems, the role of developers in the urban development, processes of urbanization and peri-urbanization, gentrification, infrastructural underdevelopment, and challenges of the sustainable spatial development. Nevertheless, they are also dissimilar

because of the differences in the political-geographical environment in Slovenia and Serbia, and the significant differences in the size of the two cities. During the workshop, students gained experience being involved in an (international) interdisciplinary professional group. Also important for their professional development are the skills gained when communicating with the professional public and preparing manuscripts to publish their findings. Students have upgraded their reports in the form of professional articles for this issue of the "Prostor" journal, published by the University of Belgrade - Faculty of Geography.

I am grateful to my colleagues at the Faculty of Civil and Geodetic Engineering, where I work as a guest lecturer at the Spatial Planning study program (subject Regional Spatial Planning), to enable my participation in the development and implementation of the cooperation with students and colleagues from Belgrade.

I give my sincere gratitude to all students and colleagues from Ljubljana and Belgrade for wonderful professional, pedagogical as well as personal experience. I believe that all participants of the international workshop have been professionally enriched and also encouraged to continue with their professional, pedagogical and scientific collaboration.

I hope that all the readers of this issue of "Prostor" will gain a better understanding of the spatial development and challenges, as well as the development possibilities of the urban regions of Ljubljana and Belgrade. It would be nice that the presented experiences of the international workshop would encourage similar cooperation in the future.

In Ljubljana, 1. 3. 2020

Associate professor dr. Simon Kušar

University of Ljubljana, Faculty of Arts, Department of Geography

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LJUBLJANA URBAN REGION

LJUBLJANA URBAN REGION ON THE LEVEL OF EU AND SLOVENIA

Ines Arh

Slovenia is situated in Central Europe, at the junction of the following biogeographic regions of Europe: Alps, Dinaric Alps, the Pannonian Planin and the Mediterranean. According to the NUTS classification, Slovenia is divided into NUTS 1, NUTS 2 and NUTS 3 levels. It has 12 statistical regions on the NUTS 3 level, in which is also Osrednjeslovenska (Central Slovenia) statistical region. The Central Slovenia region is called also Ljubljana urban region (abbreviated as LUR), after the capital city of Slovenia. It is the most densely populated in terms of the density of population, the largest in terms

of the number of inhabitants (more than a quarter of total Slovenian population) and the second largest statistical region in the country with 13 % of the national territory. It comprise of 26 municipalites. LUR has very important geostrategic point in Slovenia and on the European scale. In year 2004 Slovenia became a part of European Union (The Regional Development …, 2015). It has open border that enables free movement of people, capital, products and services, which offers good opportunities for international collaboration (Strokovne podlage …, 2009).

In LUR there are major of economic, administrative and cultural functions (Tracking the Ljubljana …, 2013). LUR is also the intersection of important transport corridors, with the city Ljubljana at the very important point (The Regional Development …, 2015). Through LUR there are the 5th and 10th European transport corridors, railway node and in vicinity there is the port of Koper and the »Jože Pučnik« international airport. With the position at the crossroads of two important trans-European transport corridors, LUR can become the center of a metropolitan European development area. This is in some ways a problem, since other regions are poorly interconnected (Strokovne podlage …, 2009).

Figure 1. Geographic position of Slovenia, LUR and its municipalities. (Source: The Regional Development …, 2015)

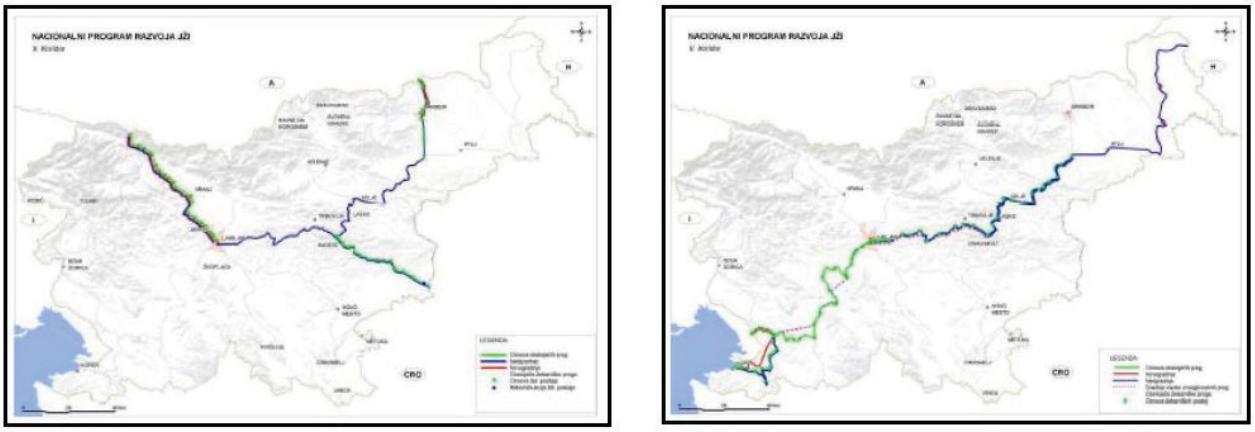

Figure 2. The 5th and 10th European transport corridors.
(Source: Strokovne podlage …, 2009)

Therefore LUR is seen as an important part of development axis at the south part of the Alps; and on the axis connecting Barcelona and Kiev. LUR connects the two different cultural systems; the eastern and the western culture; from Italy towards the eastern European countries. On international scale, Ljubljana is not treated as the city of Ljubljana, but as an urban area comprising an area of daily migrations (Tracking the Ljubljana …, 2013). Every day around 140.000 workers and students from other municipalities in the wider area come to Ljubljana (Strokovne podlage …, 2009). The important international role of LUR was given with the european programme called ESPON (European Spatial Planning Observation Network). LUR, as the only part in Slovenia, was defined as a MEGA or metropolitan growth area of European significance, even if it has just over half a million inhabitants. For Slovenia were defined six Functional Urban Areas (Tracking the Ljubljana …, 2013). There were 76 MEGAs identified in whole European Union. In Slovenia's immediate vicinity are include large neighbouring cities Milan, Bologna, Munich, Vienna, Bratislava and Budapest. Within the metropolitan area of Ljubljana, Domžale is the town recognised as the secondary regional centre. Slovenia is ranked as the most polycentric country in Europe on the basis of the polycentric index (The Regional Development …, 2015).

LUR contributes to the development of the macro-region connecting Central Europe with the Balkans (Southeastern Europe) and the Alps with the

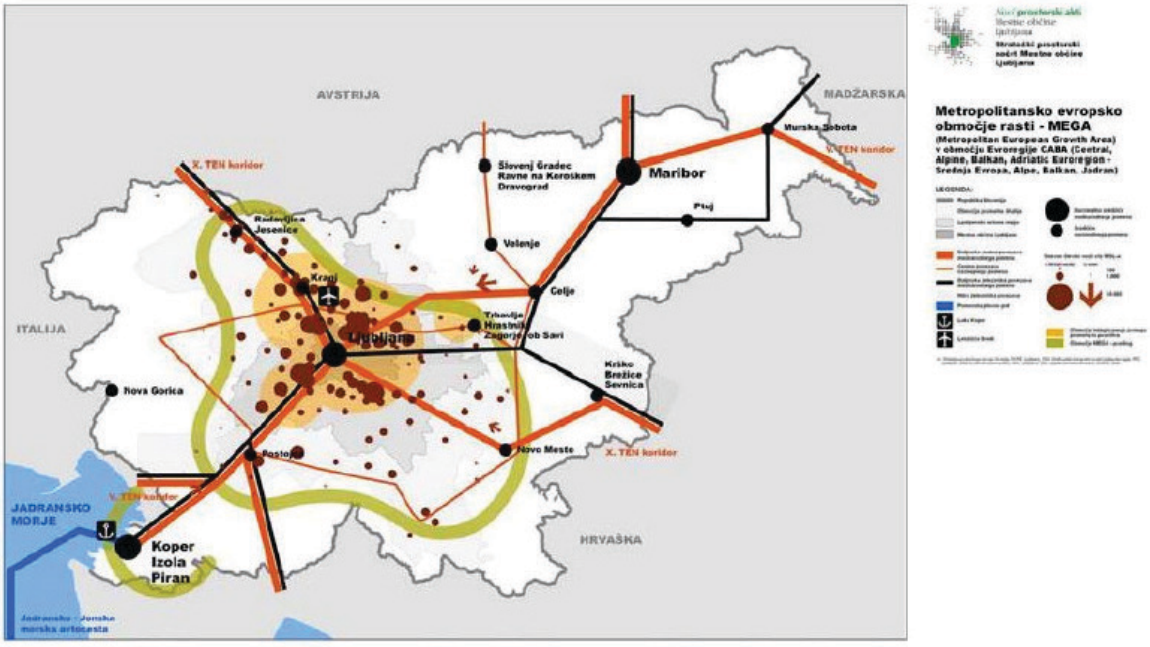

Figure 3. Metropolitan European growth area (MEGA, after ESPO).
(Source: Strokovne podlage …, 2009)

Adriatic. European union supports the establishment of network between regions that requires more balanced and polycentric development. On the level of European macro-regions, in Slovenia and in the LUR as the biggest region in the country, there are the following networks: the Alpine Convention, the Danube macroregion, the Sava Initiatives, the Adriatic, the Alps-Adriatic Working Community and the Adriatic-Ionian Initiative (Tracking the Ljubljana …, 2013). With all these networks the position of Slovenia is understood as the position of the internal EU country. The development of the Alps-Adriatic Working Community in the Alps-Adriatic-Panonija Euroregion places Slovenia in the central position of the region. The main goal is to strenght the regional development and put it closer to the most successful regions in Europe. LUR as the NUTS 3 is involved also in cross-border cooperation with neighbore countries: Austria, Italy and Croatia. The contribution is based on universities and research institutes (Strokovne podlage …, 2009).

In 2010 in Slovenia was performed a study to determine functional regions. The functional regions of Slovenia are mostly urban regions, where the city centres of the regions form around themselves a connected labour market and the gravitation towards educational, health, shopping, administrative, cultural urban functions and otherwise. Areas of functional regions are increasing and intertwining with the neighbouring ones. Therefore in Slovenia exist functional regions between Ljubljana and Gorenjska, Ljubljana and Dolenjska e.i. The Spatial Development Strategy of the Slovenia (SPRS, 2004) defines wider urban areas as areas around the centers of national importance: Ljubljana, Maribor, Koper, Celje and Nova Gorica. The definition has the main role at spatial planning in Slovenia (Tracking the Ljubljana …, 2013).

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Figure 4. European networks important for Slovenia. (Source: Strokovne podlage …, 2009)

SETTLEMENT SYSTEM IN LJUBLJANA URBAN REGION AND ITS RELATION TOWARDS SURROUNDING SETTLEMENT AREAS

Petra Kurnik

The settlements in LUR are characterized by the extremely central position of the City of Ljubljana and the star-shaped settlements close to important traffic corridors. On the inside of the highway ring that surrounds Ljubljana, a compact city has almost entirely developed. On the outside, the population spreads in five developmental directions:

- towards the northwest – Medvode, Škofja Loka, Kranj
- towards the north – Domžale and Kamnik
- towards the east – Litija
- towards the southeast – Grosuplje
- towards the southwest – Borovnica and Vrhnika

LUR, as well as other regions in Slovenia, is characterized by a polycentric system of settlements and a two-level structure of the network of nationally and regionally important hubs, which are further linked to the network of other hubs on a local level (hub of intermunicipal importance, important local hub, auxiliary local hub). This type of settlement development is envisaged in the Spatial Development Strategy of Slovenia (SPRS). SPRS is the most important strategic document from the perspective of spatial planning in Slovenia, which for the settlement area envisages, that the settlement development is primarily oriented towards selected areas, in which they care for an adequate supply of housing, positions of employment and multiple activities, but also for the corresponding infrastructure equipment (Bartol et al., 2004).

The design of settlements in LUR is as follows:

- national hub of international importance: Ljubljana
- hub of regional importance: the conurbation of Domžale–Kamnik
- intermunicipal hub: Logatec, Vrhnika, Grosuplje
- municipal administrative hub: Mengeš, Trzin, Medvode, Brezovica, Borovnica, Ig, Grosuplje (Bartol et al., 2004)

According to statistical data, there are 921 settlements in LUR with almost 550,000 inhabitants (SURS, 2019). The system of settlements in LUR has been in recent years characterised by the establishment of specialized monofunctional areas for different activities, such as: housing (dormitory towns), working (economic and business zones), accessibility and entertainment (shopping centres, sports and recreation centres, natural parks), and also space for roads (Bartol et al., 2004).

The problem with the settlement structure in LUR is the high concentration of services in the City of Ljubljana, making the development of other population hubs in the central, most urbanized part of the region, very difficult. Those settlements are starting to become dormitory hubs for the City of Ljubljana. The settlements in LUR, which should be higher ranked in the network of settlements, are operating at a lower, less important level because of Ljubljana's dominance in the region. That is also the reason why the administrative gravitational outskirts of many settlements in LUR are smaller than expected (for example Grosuplje and Vrhnika) (Urbanistični inštitut RS, 2009).

Changes are also emerging on the insides of settlement structures. Historical centres are losing their primary role in taking care of the local population and positions of employment. They are left with administrative, cultural, and educational activities, which are insufficient for the normal function of the settlement. New centres are created in the shape of marketing centres, business and industrial zones, technology parks, etc. The essential role is given to the location factors, among which, only the cheapness of the location, vehicle accessibility, and necessary municipal infrastructure are important. Gravitation directions regarding positions of employment and social activities are therefore no longer the same (Urbanistični inštitut RS, 2009).

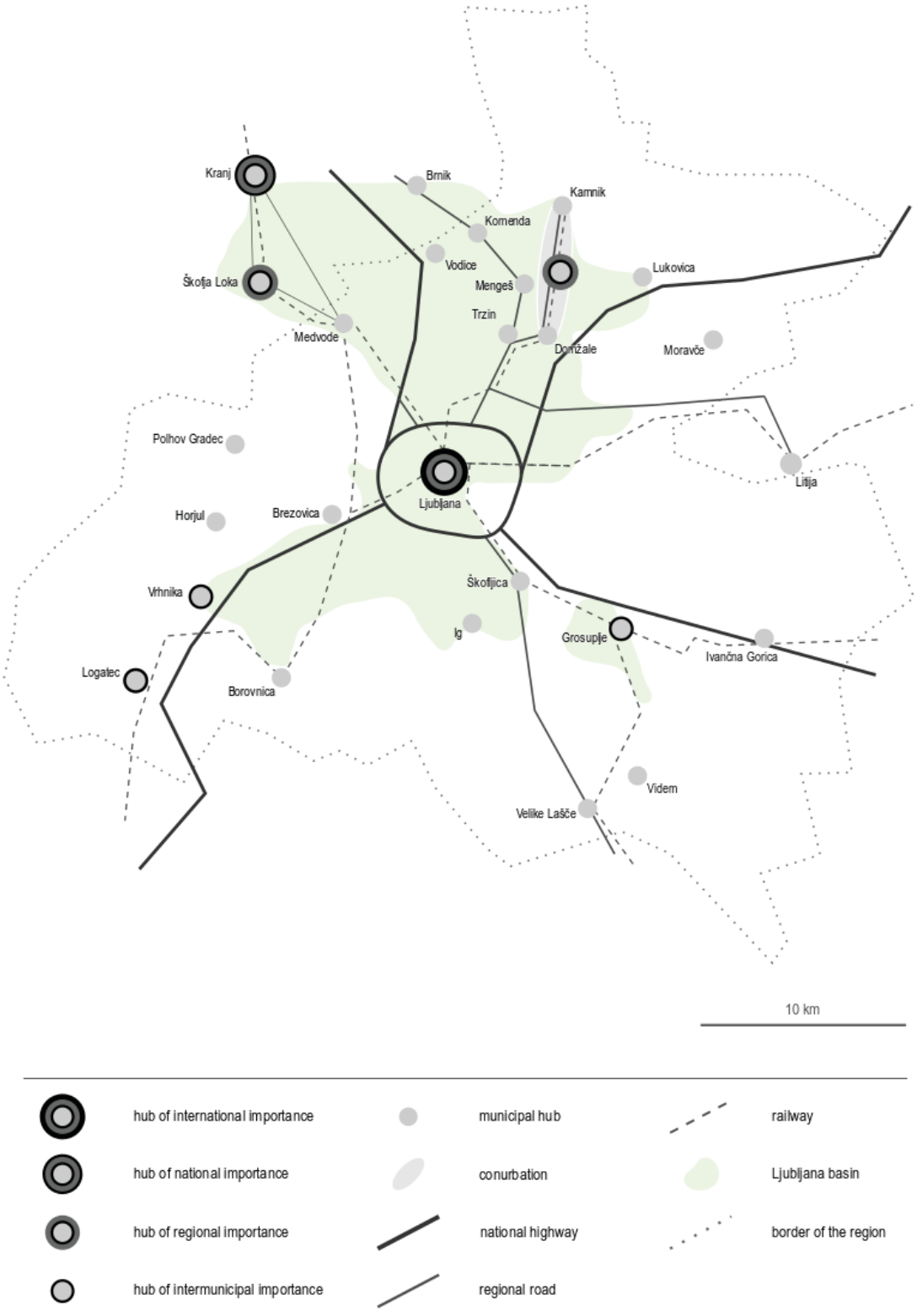

Figure 1: Hierarchy settlements in LUR according to SPRS
Author: Petra Kurnik (Source: SPRS, 2004)

To fully understand the relations among individual settlements, it is important that the analysis of the hierarchy of settlements is carried out beyond the borders of that region. The reason for this is hidden in the gravitational hinterland of the City of Ljubljana. The influence of Ljubljana is directly reflected all the way to Celje, Novo mesto, Kočevje, Postojna, and Jesenice. All these settlements, with the exception of Kočevje, represent the centres of national significance, which means that the SPRS

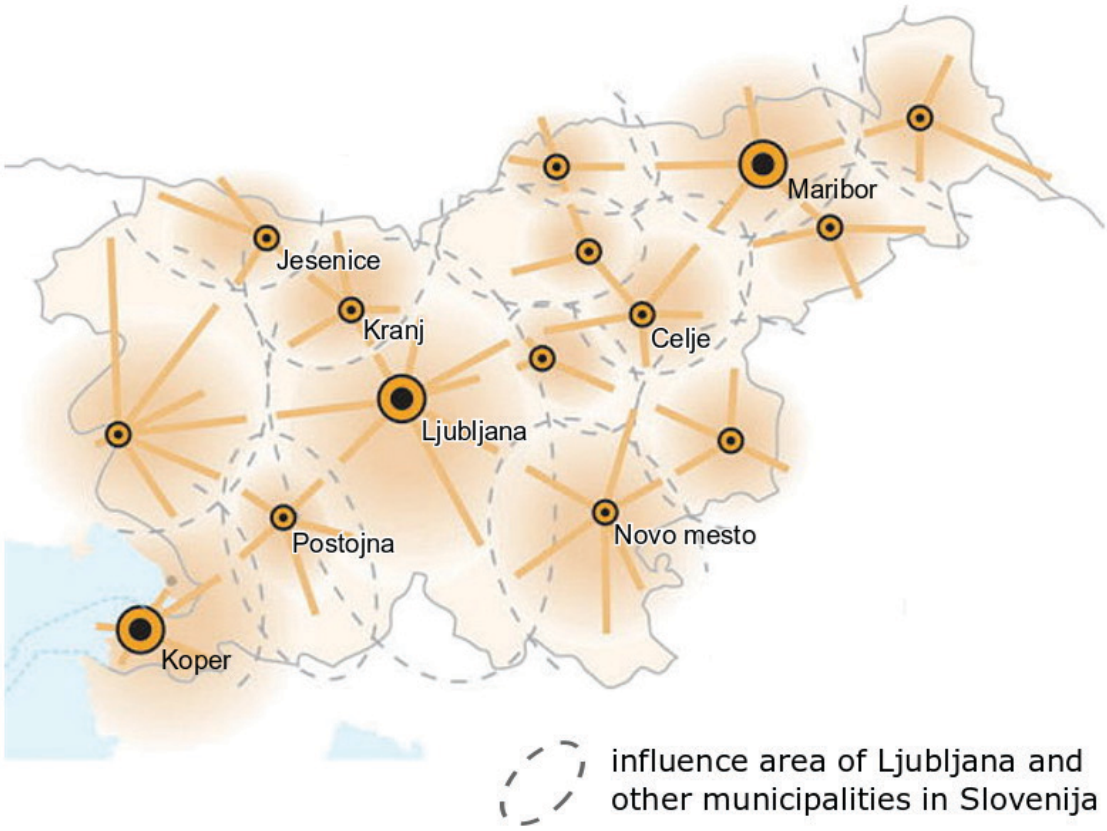

Figure 2: Influence area of Ljubljana
Source: SPRS, 2004

envisages within these settlements the appropriate type and number of the range of functions and services. Due to the strong gravitational influence of Ljubljana, these functions are not fully realised and are partially even moved to Ljubljana, which means, that those settlements do not have access to all functions that are important for the local population. As a result of that, the centrality of Ljubljana just goes on increasing at both regional and national levels (Urbanistični inštitut RS, 2009).

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TRAFFIC SYSTEM IN THE URBAN REGION OF LJUBLJANA

Meta Krivic

Slovenia is situated at the intersection of two main European corridors. We differ between ten Pan-European transport corridors (shown on Figure 1) and the Trans-European Transport Networks (TEN-T). Pan-European corridors were defined at the European transport Conference in 1994 and 1997. They were established as required major investment on road, rail and waterway routes in next 10-15 years. The TEN-T are planned set of road, rail, air and water transport networks in the European Union.

As seen on Figure 1 there are two main corridors in Slovenia, the 5th and 10th corridor. The 5th corridor goes from East to West between Venice, Trieste and Port Koper, Ljubljana and Maribor direction Budapest and Kiev. The 10th corridor runs between Salzburg, Ljubljana to Zagreb, Beograd, and Skopje and to Thessaloniki.

The TEN-T corridors are planned routes for railways in Slovenia. The Mediterranean Corridor goes between Hungarian border in the northeast of Slovenia and the Italian border direction Trieste. The second corridor called Baltic-Adriatic Corridor goes between the Italian border at Trieste with the Port Koper and through Maribor to the Austrian border.

Beside port Koper, there are two international airports in Slovenia: airport in Ljubljana and airport in Maribor. Transport corridors are running through both. With public transport airports can be reached only by bus, but not train. (Mobility and Transport - European Commission, 2019)

The capital city Ljubljana lies at the very point of corridors intersection. This means a challenge and an

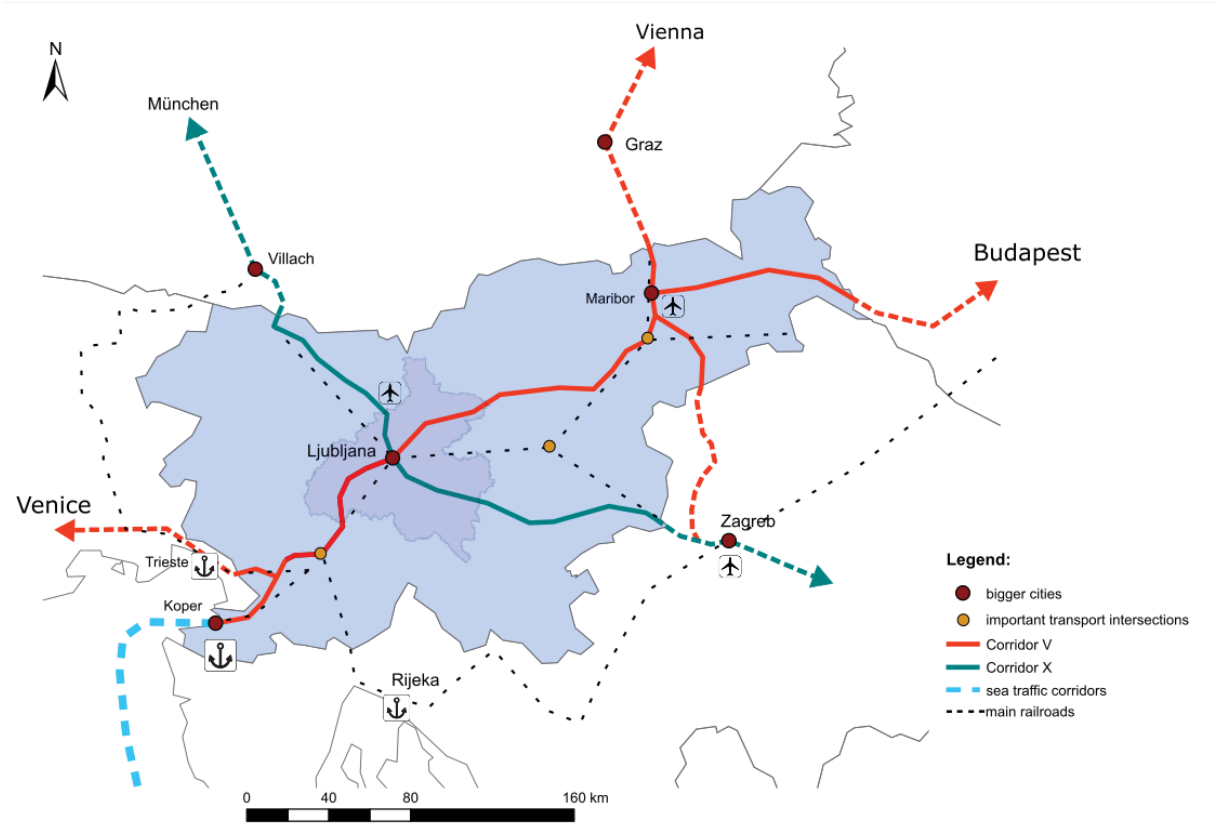


Figure 1. Pan-European transport corridors in Slovenia

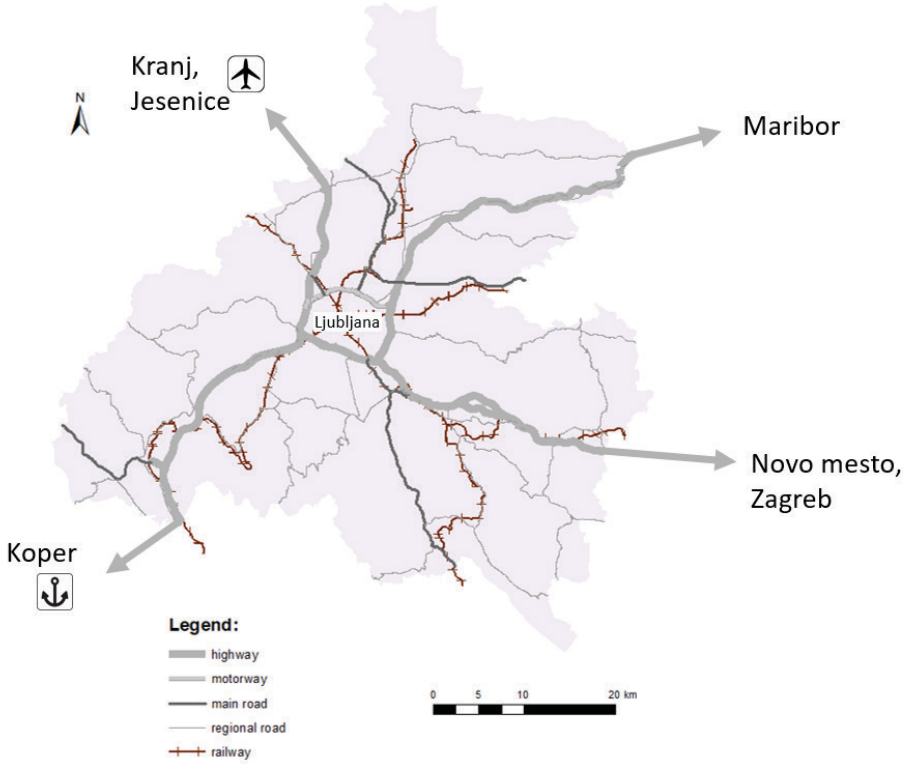


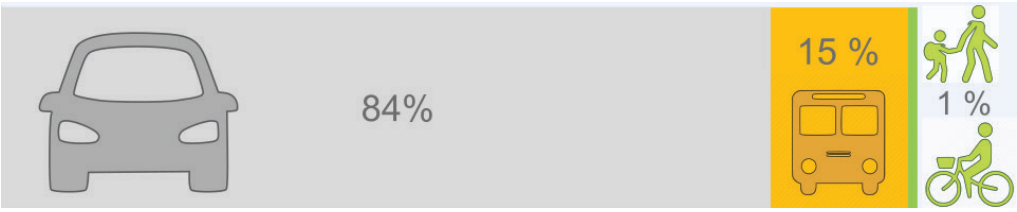
Figure 2: Roads and railways in LUR

opportunity. With fast development and population growth in the region a lot of traffic problems were induced. Consequences are traffic jams, demands for parking spaces and the quality of life in Ljubljana Urban Region. Therefore, traffic in The Ljubljana urban region is one of the main topics in the last 20 years. Investments were mostly made to highways instead of to effective public transport. Today many new documents and strategies, programs, analysis etc. were made with common resolution, to make traffic in the LUR sustainable. Although car use is still increasing, and public transport is decreasing. In the last 40 years most of the investments for transport development went for building highways. Highways A1 and A2 are compliant with European traffic corridors (Figure 2). They intersect in Ljubljana with bypass around Ljubljana. Railways intersect in Ljubljana as well. There are five track lines that meet at the principal railway station in Ljubljana and are used for public transportation and cargo. (Nared, J., et al., 2012)

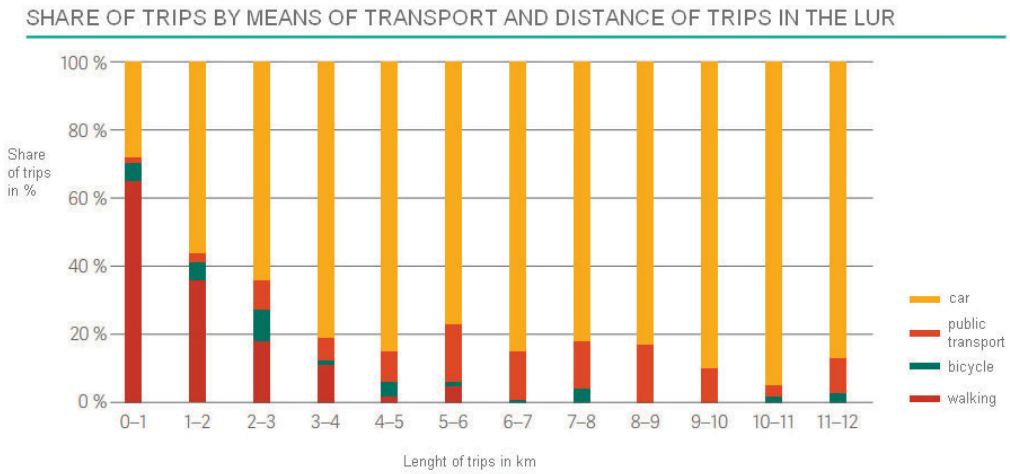
The LUR is dominated with cars. As seen on graph 1, daily 84% of trips in the region to Ljubljana are car trips. One car is usually used only by one person (1,4 person), and only 15 % trips are with public transport and the rest is walking and bicycling.

Car is also used very often for only short trips. On the graph 1 is shown share of passenger transportation based on transport type and length of trip in the LUR. (Raziskava potovalnih navad v MOL in LUR, 2014).

Existing problems are the result of bad public transport with slow railway modernization and expensive bus transport with infrequent service outside main corridors. Consequence is traffic jams and needs for car parks in Ljubljana. On two main roads direction Ljubljana there is yellow line dedicated only for busses and taxies. It encourages people to use public transport and reduces private vehicles. (Celostna prometna strategija Ljubljanske urbane regije, 2018)



Graph 1. Choice of transport in LUR to Ljubljana



Graph 2. Share of trips in LUR by means of transport and distance (Raziskava potovalnih navad v MOL in LUR, 2014)

One solution of a problem was an organisation of multiple PARK and RIDE car parks (P+R) at the outskirts of Ljubljana. They allow commuters from LUR and other people to park their car and ride bus or public bicycle to city centre. Now there are already 28 P+R facilities in LUR. The only problem is trains cannot be used, since there is no commuter or short-distance rail network in LUR. (Ljubljanski potniški promet, 2019)

Figure 3. Park and ride facilities (N. Rovan)

For the development of sustainable transport, a bicycle system called Bicikelj - city bikes was created. With yearly subscription one can hire and return a bike at one of Bicikelj stations that are strategically located in Ljubljana. Bikes from the system are not used for longer distances in LUR. That is because the stations don't cover the whole region and bikes are not practical for long distance. Furthermore, there is a lack of cycle lines in LUR, especially outside of the city of Ljubljana. (Nared, J., et al, 2017)

Figure 4. Bicikelj station (P. Logar)

Besides commuter, freight transport is increasing as well. Mainly (75 %) freight transport performs on road. One of the reasons is the node of European corridors, which makes LUR a transit region. A large share of cargo comes from Port Koper and airport Ljubljana. (Study on Strategic Evaluation on Transport Investment Priorities under Structural and Cohesion funds for the Programming Period 2007-2013, 2006)

Unfortunately railways are slow as a consequence of terrain and Ljubljana Marshes on the south of the LUR. The share of freight transport is expressed on the quality of the environment with noise emissions, air pollution, traffic congestion, safety risks, etc. The

LUR would need a highway as well as railroad bypass for cargo transportation to avoid Ljubljana. More important would be to redirect most of the freight transport on railways instead of roads. (Public transport in the Ljubljana Urban Region, 2010)

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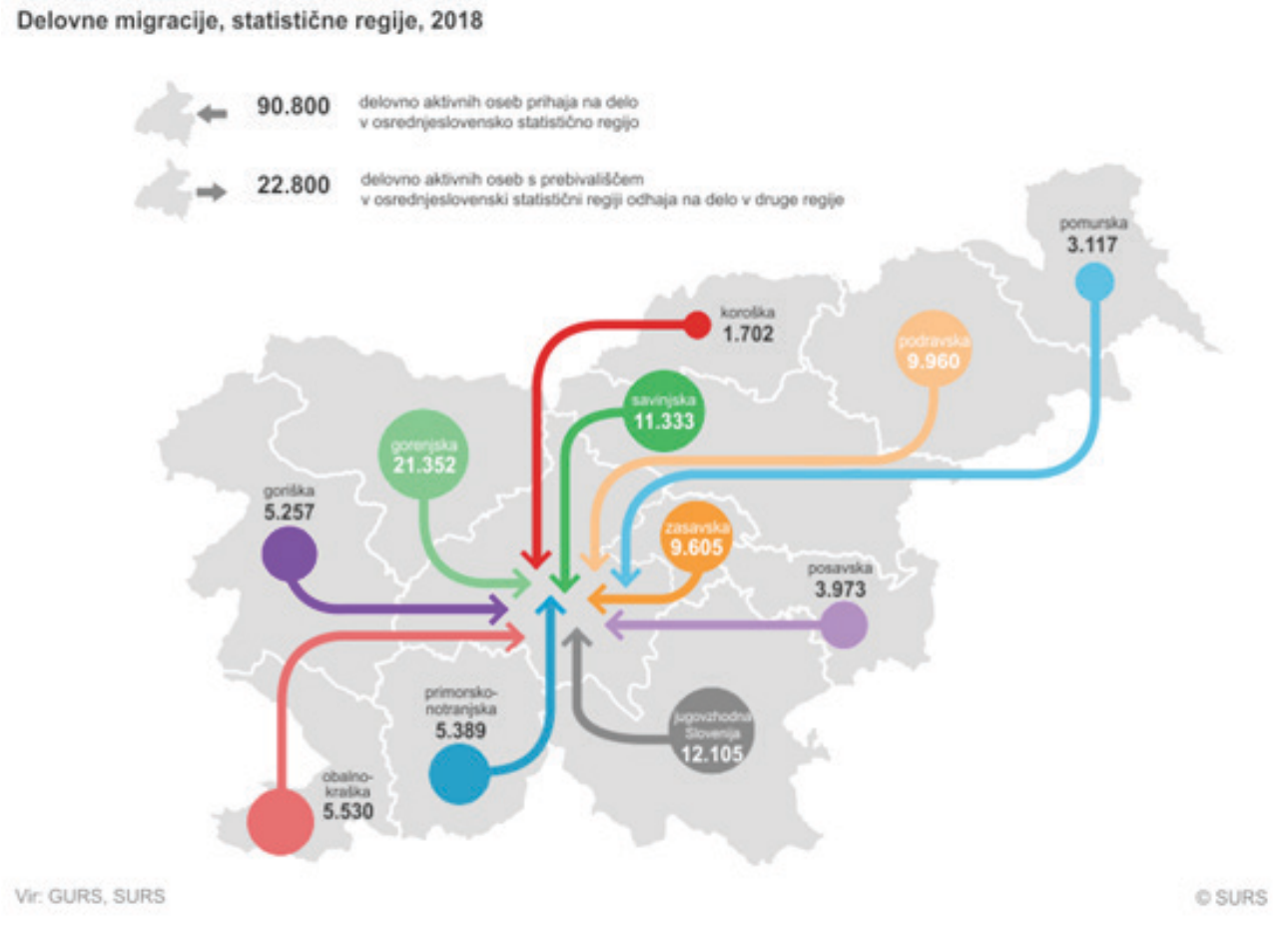
DAILY MIGRATIONS IN THE LJUBLJANA URBAN DISTRICT (LUD)

Luka Šavron

LUD remains the most important goal of migration flows in Slovenia, because its inhabitants drive to the city on a daily basis for work or school from other Slovenian regions. People come for work to this region mostly from Kranj, Trbovlje, Novo mesto, Koper, and Celje. In June 2013 this region had 215,309 employed persons which represents 27% of working population in Slovenia (RRA LUR, 2015). At the end of 2018, every other person in active service in Slovenia went to work in a different municipality, in other words 457,000 or 52.9% of working population. The share of daily migrants had increased by 4.4% from the end of 2017. In the area of the same municipality the largest number of residents and employed persons was in Ljubljana (82.3%), followed by the municipalities of Novo mesto (73.3%) and Maribor (70.9%). Facing the daily working migrant flow, Ljubljana was the most burdened municipality, while the Trzin municipality had the highest labor migration index. Both municipalities are located in the Ljubljana Urban Region.

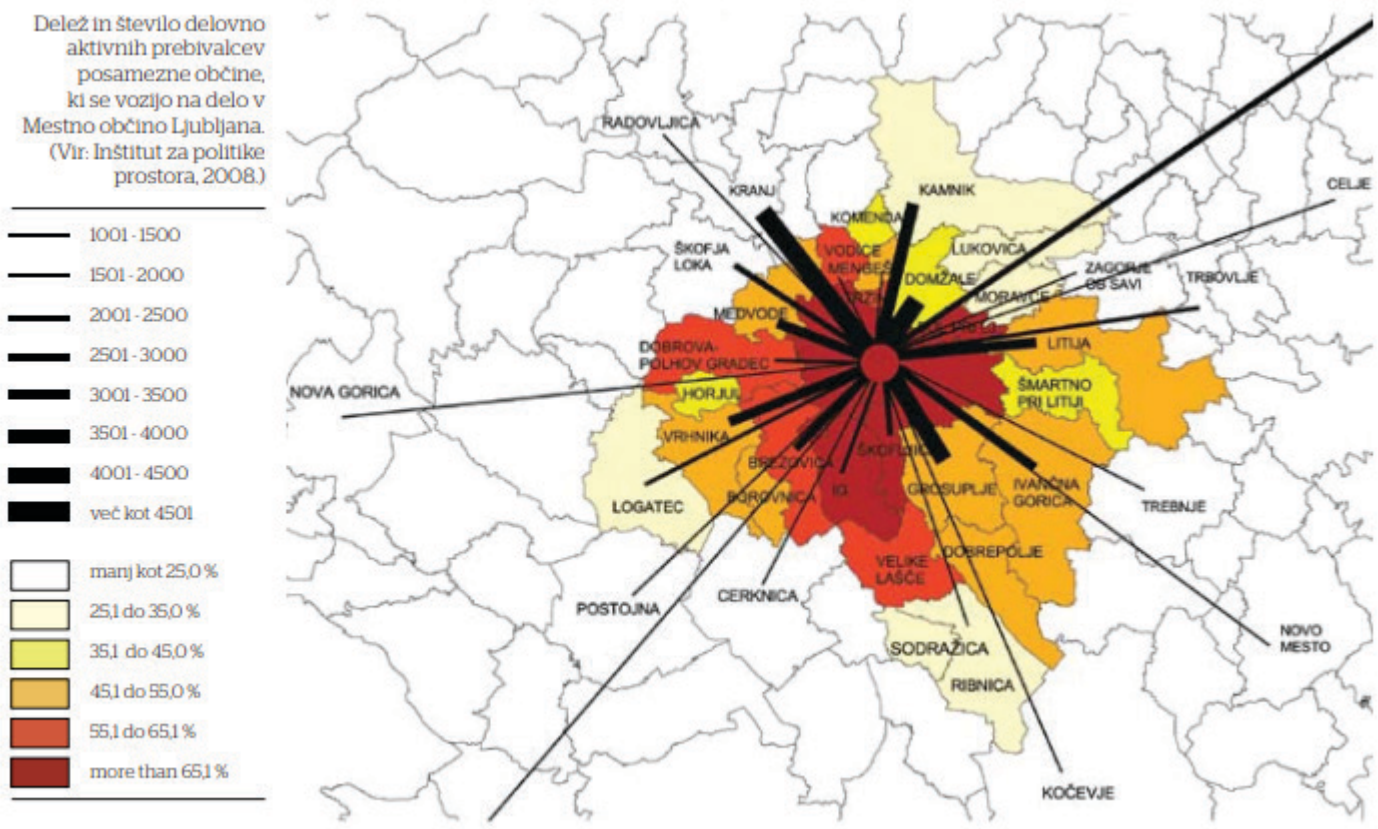
On a daily basis, 90,800 people come to work in LUD, while 22,800 people in active service leave to go to work in other regions in Slovenia. People mainly arrive to LUD from the Gorenjska statistical region (21,300 people), followed by the Southeastern region (12,100), and Savinjska statistical region (11.300). From all statistical regions to LUD at least 3,000 employed persons migrate on a daily basis.

On the national level, the Municipality of Ljubljana carries the heaviest load, because more than 127,600 people come to work there on a daily basis, while



around 22,100 people leave for work as well. Commuting flows for the Municipality of Ljubljana together make up almost 150,000 employed persons. The Municipality of Maribor is in the second place with around 44,300 daily migrants in both ways, followed by Celje in third place with a little more than 27,000 working migrants. Figure 2 shows the number of employees that go to work exclusively to Ljubljana. From there we can see that on a daily basis people come from all parts of Slovenia, except from its far East which is most distant from Ljubljana (around a 90-minute drive).

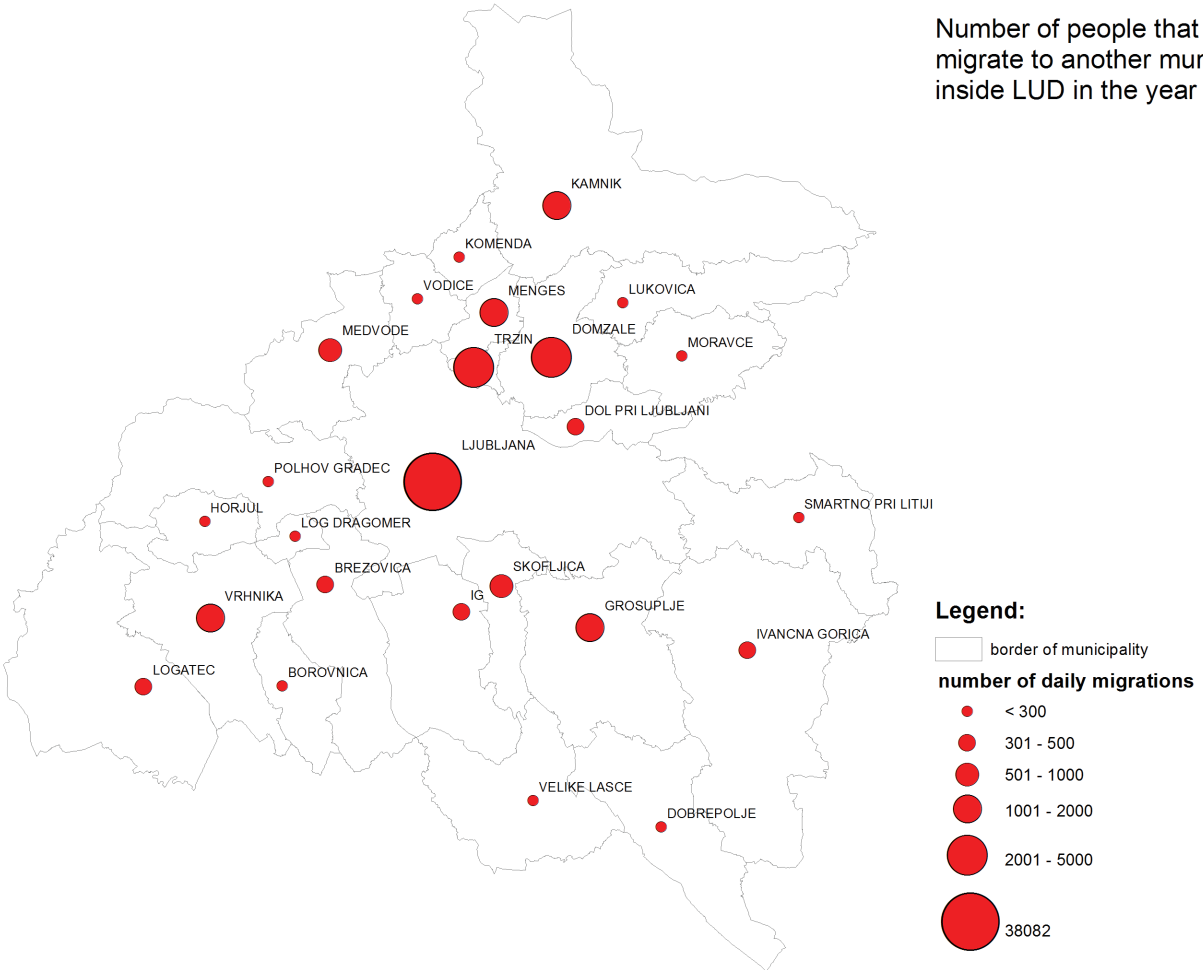
Due to the large number of people who migrate to LUD, we are witnessing many traffic jams and general overcrowding, especially on the ring roads and highway intersections. The biggest crowds are during the morning (between 7:30 and 8:00 a.m.) and afternoon rush-hours (between 4:00 and 4:30 p.m.). Most people use their cars to drive from their home to work, only few decide to use the bus and/or train.



In 2018, LUD was the only place to have a higher number of workplaces than inhabitants in employment. Inside LUD we can notice big differences in migrations between municipalities. On the one hand we have municipalities with high employment rates – Ljubljana, Domžale, Trzin, Kamnik, Grosuplje, Vrhnika, and Mengeš, while on the other there are a bunch of municipalities with low employment rates like Ivančna Gorica, Ig, Dobrova – Polhov Gradec, Borovnica, Horjul, Dobrepolje. From the municipalities in LUD, most people migrate daily to the Ljubljana municipality (more than 38,000), followed by Domžale with 4,000 and Trzin with 2,300 people migrating on a daily basis.

Trzin is classified among the so-called distinctively working municipality, where we classified the ones that have at least 16% more workplaces than the number of work active residents. At the end of 2018, there were 16 municipalities like this in Slovenia. Among these municipalities, the Trzin municipality stands out especially as it had three times more jobs than partially active persons residing in that municipality. In total, almost 5,300 people came to work every day in Trzin.

Within LUD, the least persons from other municipalities went to work in the Municipality of Velike Lašče (only 62 persons) and the Municipality of Moravče (92 persons).



Most people use cars for transport from residence to work (that is why we have traffic on a daily basis from origin to work and from the destination to residence), considerably fewer people use the train and the bus. In the future, if we want to avoid major traffic congestion, we will have work hard on transport strategies and convince people to use alternative transport (train, bus).

CONDITION AND CONNECTION OF GREEN SYSTEM ON THE REGIONAL LEVEL

Anja Judež

Ljubljana boasts with an astounding per capita of green space provision of 542 square metres (per inhabitant), some of which can even be found in the heart of the historic city centre, which has been closed for car traffic since 2008. Thanks to its exceptional environmental awareness, Ljubljana is a city with a green soul (Figure 2). They have managed to preserve green character of city to the present day. It proudly holds the title of European Green Capital 2018 (Visit Ljubljana, 2018).

The Ljubljana Urban Region has 31,419 hectares of land (12.3% of the entire region), which fall within the protected areas of nature (Figure 1). Among these 67 areas, 8 of them have status of a landscape park, 21 of natural monument 10 of natural reserves and 28 of monument of shaped nature.

The municipalities with the largest protected areas are Medvode and Dobrova - Polhov Gradec covered by the Landscape Park (hereinafter: LP) Polhov Gradec Dolomiti, which is one of the biggest LP in Slovenia. City of Ljubljana also has three landscape parks: LP Tivoli, Rožnik and Šiška Hill (Figure 4), LP Zajčja Dobrava and LP Ljubljansko barje which extends beyond the municipalities of Borovnica,

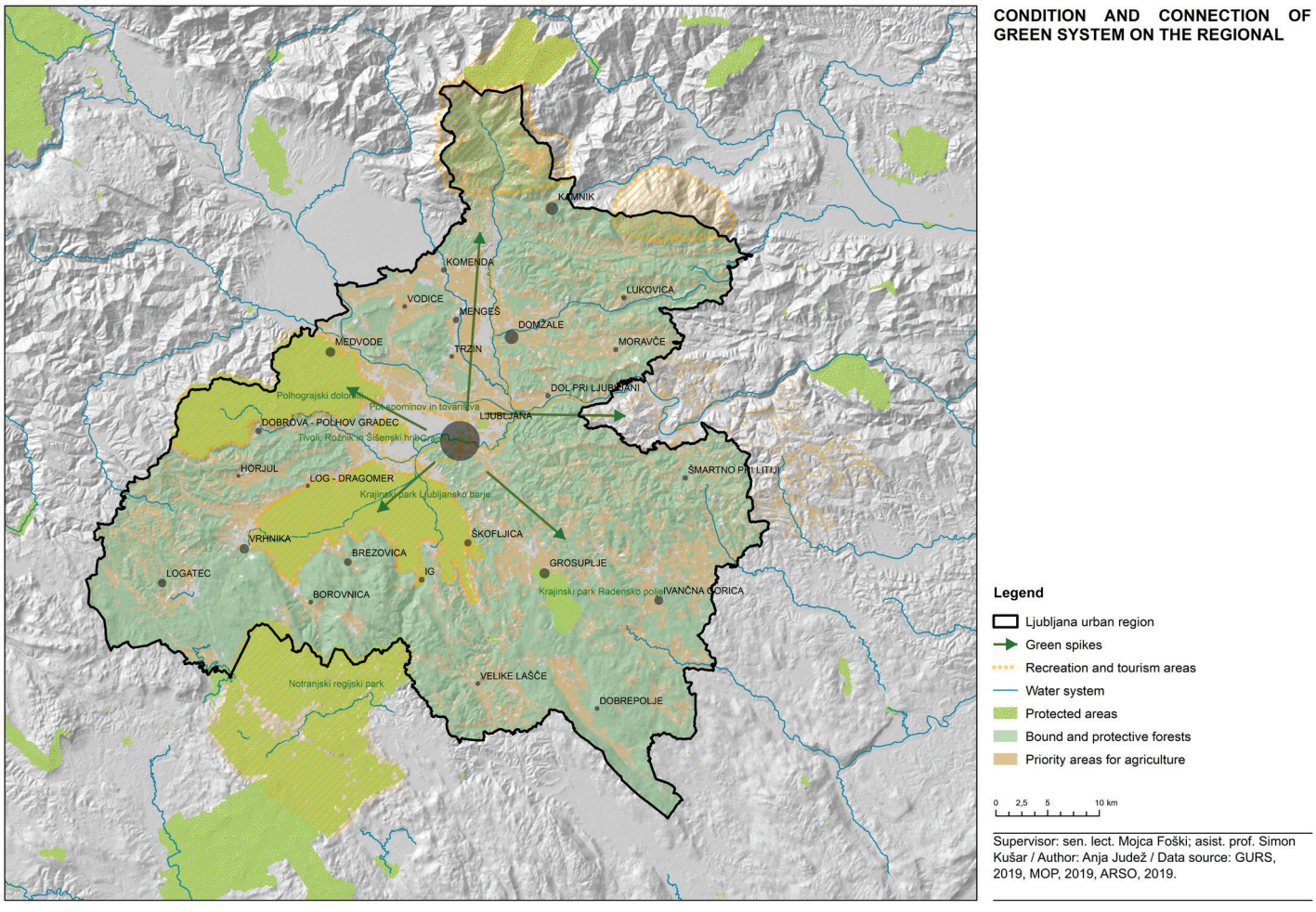


Figure 1: Analyses of condition and connection of green system in LUR
Source: Anja Judež

Log – Dragomer, Brezovica, Vrhnika, Škofljica and Ig. In the municipality of Grosuplje there is LP Radensko polje and in Domžale they have the Memorial park of revolutionary traditions. Most protected areas (points) are located in the municipality Logatec.

Figure 2:. Ljubljana city centre with a lot of green areas
Author: Janez Kotar

Areas of natural values are evenly distributed throughout the region, while the concentration of natural values (points) mostly occur in the municipalities of Ljubljana, Grosuplje and Kamnik.

The protection of naturally more preserved surfaces is necessary due to the provision of cultural identity and quality living conditions of people in the region. Naturally preserved areas carry out many ecological and social functions, such as the protection of land, regulation of climate and hydrological conditions, protection of natural resources, mitigation of the consequences of natural disasters, recreational and aesthetic functions.

In the LUR there is 62,617 ha of land in agricultural use, which is less than a quarter of the entire territory of the region. The area of utilized agricultural area in the LUR is the smallest in Slovenia. Forests cover 145,254 ha of land, which represents 58,4% of the territory.

Forest and agricultural areas cover the majority of the LUR area (more than 90%) and therefore determine the landscape of the whole region. Agricultural use is extensive and anandoned in hilly areas and intensive in lowland areas.

Forest covers, in particular, hilly, steeper and more difficult accessible areas. In the structure of agricultural land use, the largest share of permanent meadows (60.55%) (Figure 4), followed by fields (21.96%), marshes (7.61%) and extensive orchards (2.51%).

The Ljubljana forest management area is the largest area in Slovenia and occupies around 12% of the surface of Slovenia. In the area there is the largest

Figure 3: LP Tivoli, Rožnik and Šiška Hill in the center of Ljubljana

number of mixed forests (60%), there are 26% of leafy forests and only 14% of conifers. Beechwood (34%) and spruce (32%) predominate among the tree species according to the wood stock. The annual increment of forests is 6.43 m3 / ha, and the annual possible harvest is 3.59 m3 / ha (SFS, 2012).

Figure 4: Ljubljana marshes (Author: Branko Ceak)

Forests in LUR are in 88% privately owned, only 11% of forests are state-owned and less than 0.5% are municipal forests. Most owners have a highly fragmented and spatially unrelated property and have no interest in forestry.

The ecological and social functions of forests and the production function of forests is strongly affected by forest management in the area of the region. A large part of the area is occupied by protective forests (7.3%) and forests with a special purpose (9.3%). In recent years, the area of the forest has been shrinking mainly due to the construction of infrastructure and the spread of settlement (SFS, 2012).

The development of the countryside is linked with the development of foresty and mostly agriculture. In addition to the economic importance of agriculture other functions are also coming to the front as agriculture preserves settlement in rural areas and contributes to the development of other rural activities, such as recreation, tourism, the preservation of cultural heritage and landscape,... Agriculture also plays an important role in the environmental segment and from a territorial point of view.

Potential for future development is also in unused agricultural land and other land suitable for agricultural production the use of which can contribute to the greater dietary subsistence of the region.

The condition of a well-preserved environment in the region should be maintained, since such environment is the basis for preserving biodiversity, landscape diversity and the provision of ecosystem services and at the same time constituting a quality living environment for the inhabitants of the region and great potential for the development of nature-friendly tourism.

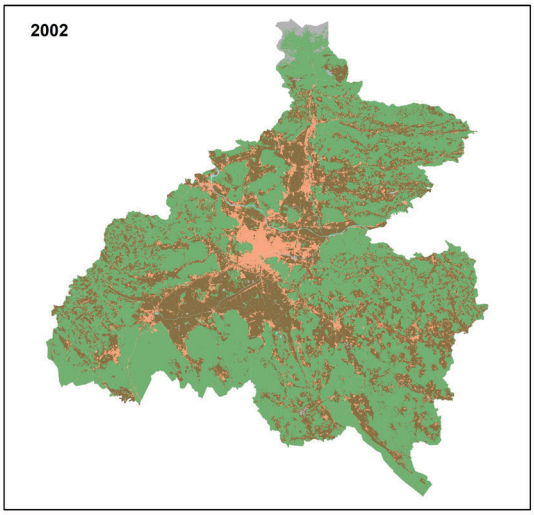
ANALYSIS OF THE CHANGE OF LAND USE

We analyzed the change of land use between 2002 and 2019 with data from MAFF.

Land use is divided into basic and detailed use of space. We distinguished 5 categories of basic land use:

- areas of urban land,
- areas of agricultural land,
- areas of forest land,
- water areas and
- areas of other land.

For the categories of basic land use, we calculated the area in ha and determined the proportions of individual categories in relation to the total area considered by the LUR. The results and findings of the basic land use for the entire area year 2009 and 2019 are presented in figure 5 and 6.



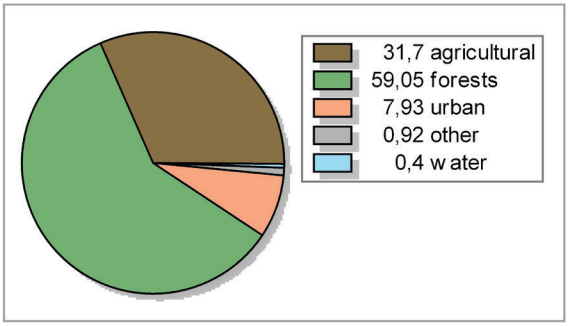


Figure 5: Land use in 2002 Source: MAFF, Anja Judež

During the analyzed periods, the populated areas increased by 0.62%, which is 1459.25 ha. Surprisingly, in addition to the populated areas, agricultural areas also increased and reduced forests. Agricultural land is more by 0.31%, which represents 719.38 ha.

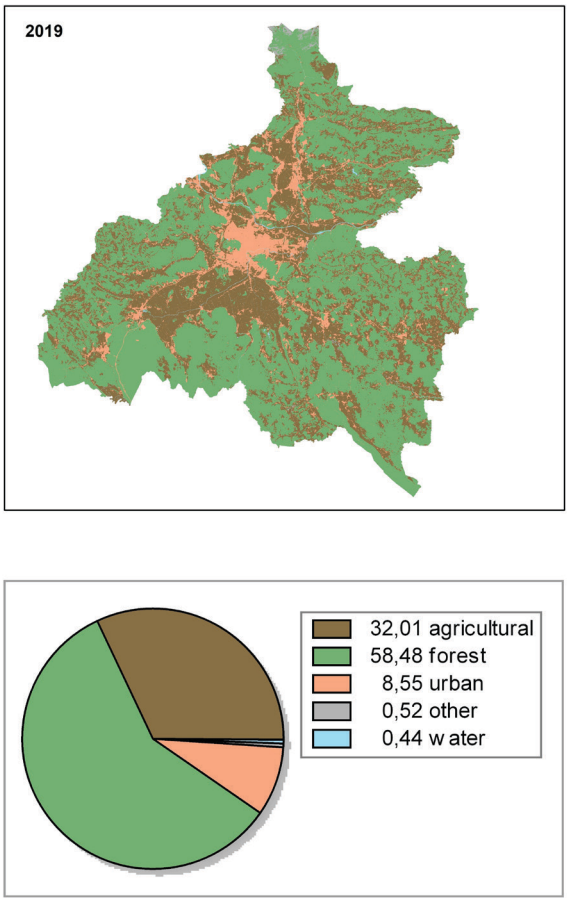


Figure 6: Land use in 2019
Source: MAFF, Anja Judež

Potentials of preserving the natural environment which is a beautiful and preserved nature in the region. This is a prerequisite for developing the potentials of the region, such as agriculture and tourism. Since one of the most recognizable characteristics of Slovenia is a well-preserved nature (especially great landscape diversity and biodiversity, multiple habitat types, rich flora and fauna, variety of samples of cultural landscapes diverse geological structure, and many more), there is a lot of space for the development of other activities looking for opportunities in rooms with a high degree of natural conservation.

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DEMOGRAPHIC ANALYSIS OF LJUBLJANA URBAN REGION (LUR)

Špela Osolin

In this demographic analysis we deal with the main trends that cover the LUR's population. Due to the excess of data, we analyzed the data mostly from 2008 onwards, so we got a 10 - year timeframe. It is important to note that the Municipality of Litija left the region in 2015, so we e liminated its data since 2008. We obtained the data from the Statistical Office of the Republic of Slovenia (SURS, 2019) and processed and analyzed them in Excel. Some trends were shown on the graphs, as well as on the cartographic material we made using the ArcMap program.

With an area of 2,334 km², LUR occupies 12% of Slovenian territory. In 2018 more than a quarter of the population of Slovenia lived in LUR (26%). In 2018, there were 543,964 inhabitants in the region. LUR is the most populated region in Slovenia (Figure 1).

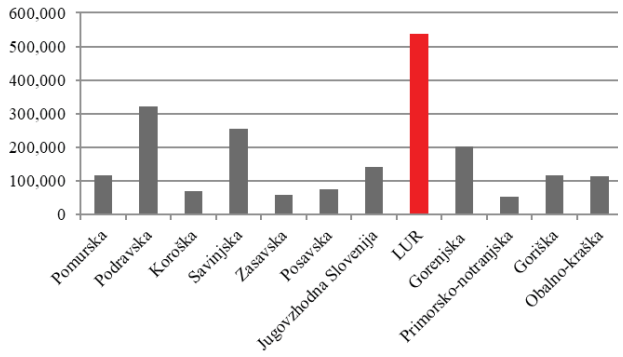

Figure 1: Number of population by regions in Slovenia Source:SURS, 2019.

In the region, there are 2% more women than men. Population in the region has been growing since 2008. The downward trend is not notable, as the population increased by 7% or for 36,528 inhabitants in the 10 years.

There is no significant difference in the number of inhabitants between municipalities, only the Municipality of Ljubljana stands out.

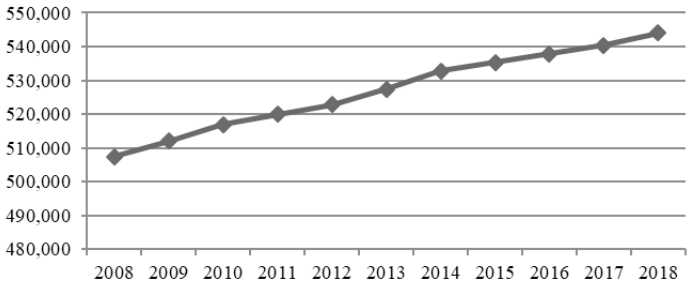

Figure 2: Movement of the population in LUR between 2008 and 2018 Source: SURS, 2019.

Between 2008 and 2018, the number of inhabitants in the municipality of Ljubljana increased by 4.9%. In 2018, Ljubljana had 289,518 inhabitants, which is 54% of the region's population. There are major differences in the change in the number of populations between LUR's municipalities. Namely, in ten years the number of inhabitants increased the most in the Municipality of Škofljica (31.9%) and in the Municipality of Komenda (21.8%) (see Figure 3). The smallest change in the population number was recorded in the Municipality of Dobropolje in the south-eastern part of the region (1.5%). Whatever the difference, the changes in the population number in any municipality were not negative.

The density of population was more than twice as high in LUR in 2018 (233.1 inhabitants/km²) as was average for Slovenia (102.1 inhabitants/km²) (see Figure 4), but there are significant differences within the region-Ljubljana has a population density of 1048 inhabitants per km², while the most unpopulated municipality of Dobrepolje has only 38 inhabitants per km². The municipalities with higher densities are located in LUR central part –these, i.e. municipalities of Ljubljana, Domžale, Komenda, Log - Dragomer, Medvode, Mengeš, Trzin, Medvode and Škofljica (Figure 5). LUR is by far the most densely populated region in Slovenia.

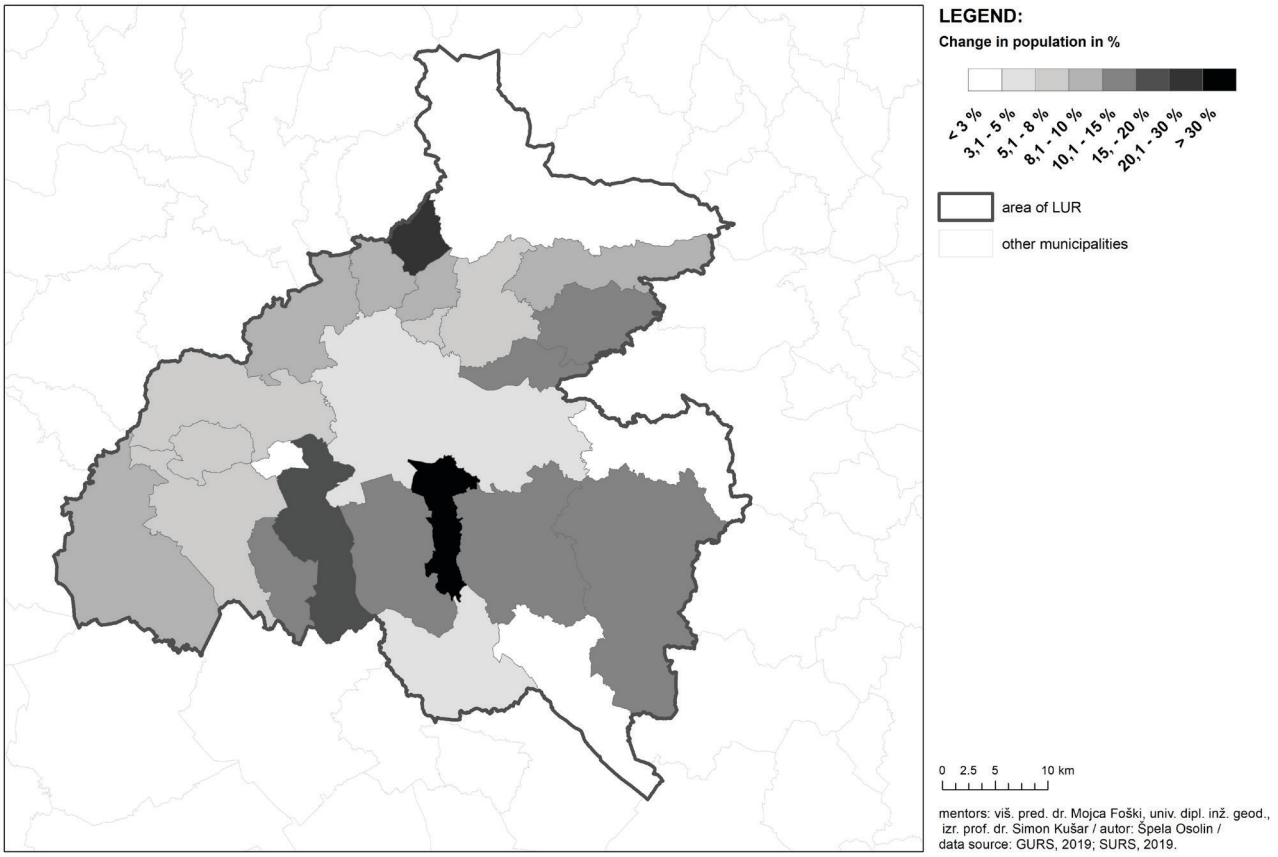

Figure 3: Change in the number of population in LUR between 2008 and 2010

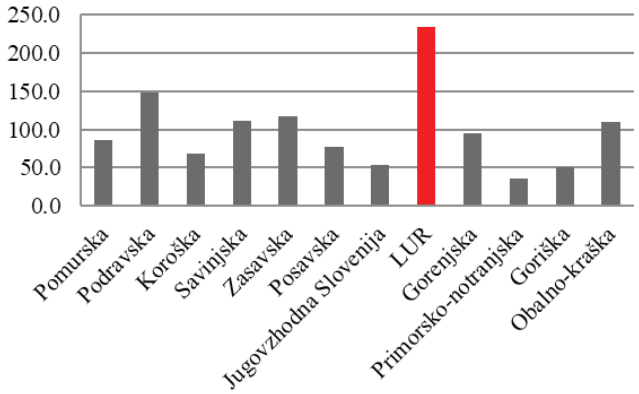

Figure 4: Population density by regions in Slovenia
Source: SURS, 2019

LUR has the highest natural increase in terms of regions in Slovenia, which in 2017 amounted to 2.1 per 1000 inhabitants (Slovenia 0.1). Besides, LUR is one of the four regions in Slovenia, with a positive natural increase. Other regions (8) experience a negative natural increase.

Nevertheless, the natural increment has been falling. Figure 7 shows that the situation changed considerably from 2008 to 2017. In 2008 the largest number of municipalities within LUR had with a natural increase of 3.1 to 6 per 1000 inhabitants, while in 2017 the majority of municipalities were within the range of 0.1-3. In most municipalities there were negative changes. The Municipality of Dol pri Ljubljani, which had a 10.1 natural increase per 1000 inhabitants in 2008, only had an increase of 4 in 2017, indicating a significant decline in births. Only a small number of municipalities had a positive change. For example, the Municipality of Šmartno pri Litiji, brought the negative natural increase from 2008 to a positive level in 2017.

In 2017, the in-migration with abroad increase and was 596 persons, while the migration increment between the statistical regions was 896 persons in favor of the LUR. The total increase per 1000 inhabitants was significantly above the Slovenian average (0.5), as it stood at 4.9 in 2017. However, it is clear from the Figure 6 the that total increase has been declining considerably since 2008. The region detects immigration in comparison with other regions. Namely, in 2018, the share of foreign citizens in the region was already 8.3%, which ranks second in the proportion of foreign citizens and is immediately behind the Obalno - kraška region.

Despite the positive natural increase, the population is aging. In 2017, LUR's aging index was 113.5

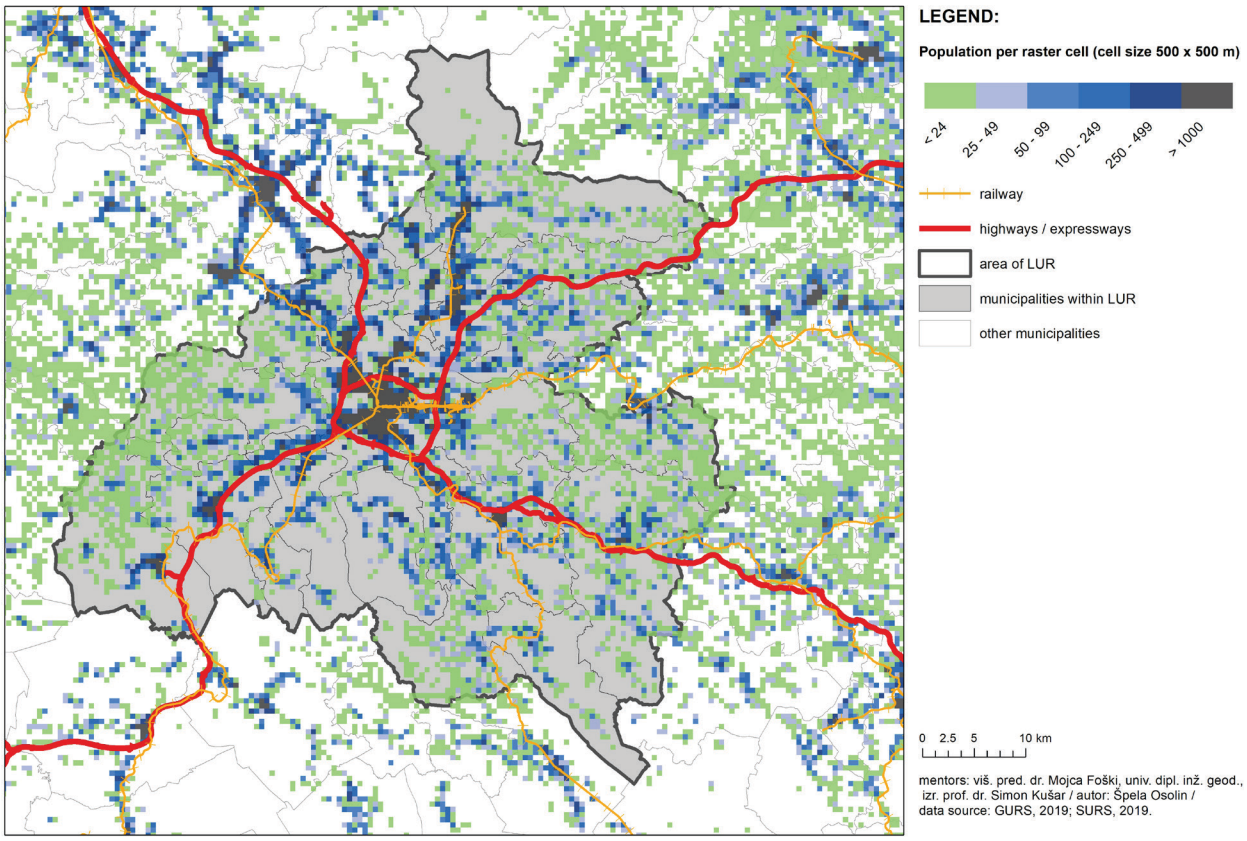

Figure 5: Population density in LUR in 2018

(Slovenia 130.6), putting it in 11th place among Slovenian regions. The aging index is increasing year by year, indicating an unfavorable demographic picture in the future.

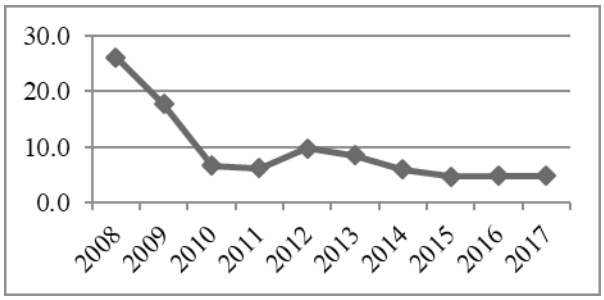

Figure 6: Movement of total incease in LUR between 2008 and 2018
Source: SURS, 2019

The Municipality of Log-Dragomer has the highest aging index in LUR. The aging index of the Municipality of Log-Dragomer was 150.4 in 2018, which also ranks the municipality among the municipalities with the highest aging indexes according to the Slovenian average (130.6 for 2018). In 2018 the Municipality of Ljubljana had an aging index 134, which ranks it second, immediately after the Municipality of Log - Dragomer. In 2018, 14 municipalities in LUR had more population under the age of 15, as their aging index was under 100. The Municipality of Komenda especially stands out as its aging index in 2018 was 66. We can confirm that the municipalities in the vicinity of Ljubljana have a more favorable aging index at the level of the Slovenian average (with the exception of the Municipality of Log - Dragomer).

The share of the population below the age of 14 increased from 14% (SLovenia 14%) to 16% (SLovenia 15%) in 2018 from 2008 in LUR. The share of the elderly from 64 years increased from 16% in that period (Slovenia 16%) to 18% (Slovenia 19%). In the period between 2008 and 2018, the share of the working age population fell by four percent for those aged between 15 and 64, which in 2008 amounted to 70% (Slovenia 70%), and in 2018 it was barely 66% (Slovenia 66%), which means questionable opportunities to provide an innovative and productive environment and further development and social security of the inhabitants of the region.

These results are more negative than positive. Also, the coefficient of age dependence is higher every year. In 2008, it stood at 43.4 (Slovenia 43.3), and in 2018 it rose to 52.3 (Slovenia 53.2). The coefficient of age dependence of the elderly is an indicator that

shows the number of age dependent people per 100 working age population. This is a key indicator for expressing the demographic pressure in the future on the economic situation in a society. The indicator provides a graphical representation of the change in the rate of the aging trend on various spatial units, which allows monitoring of the homogeneity of trends in micro and macro environments over a long period of time. In this respect, areas with a high growth rate of the coefficient are very important because in these areas the population is very old, which requires infrastructure adaptations in the environment: homes for the elderly, mobility, health infrastructure.

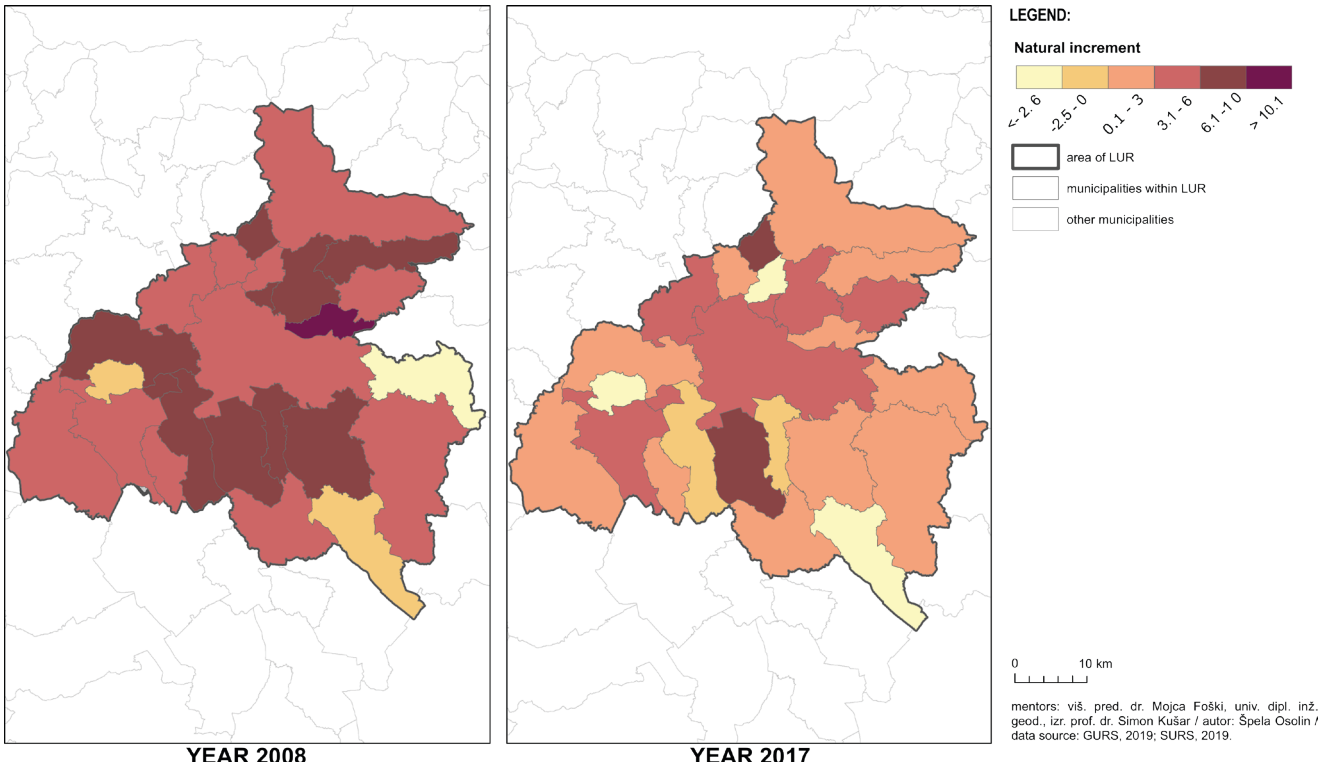

Figure 7: Changes of natural incremant in LUR between 2008 and 2017

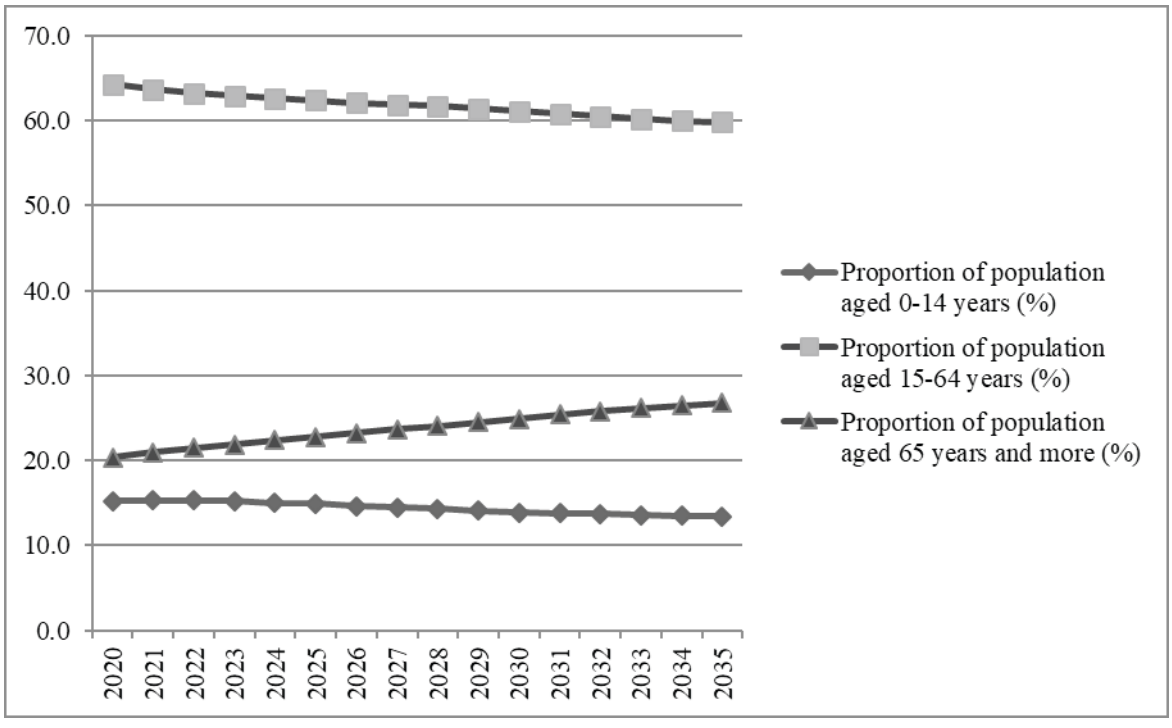

Figure 8: Demographic projection of the share of population by age groups from 2020 to 2035 for Slovenia
Source: SURS, 2019

According to demographic projections, population aging will be a considerable problem in Slovenia. The decline in the working population will be another (see Figure 8). Therefore, this will need to be adapted, including by adjusting space according to the needs of the population and incorporating the necessary understanding of the demographic change into (regional) spatial planning.

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ANALYSIS OF TOURISM IN LJUBLJANA URBAN REGION

Špela Osolin

In the context of tourism analysis, we analyzed the main factors that influence spatial design, both directly and indirectly. We mainly analyzed statistical data from the Statistical Office of the Republic of Slovenia (SURS, 2019). Due to the excess of data, we analyzed the data from 2008 onwards to obtain a ten-year framework. It is important to emphasize that the data processing methodology from SURS changed for the first time in 2010 and again in 2018. Therefore, there may be some inconsistencies in the data.

The Ljubljana Urban Region (LUR), provided a tenth of the accommodation capacities in 2018 in Slovenia or 14, 487 (SLO 134, 808) beds. The region was in third place in the number of overnight stays among twelve Slovenian regions (1,753.699). 14% of all tourist overnight stays in Slovenia were in LUR in 2017. In the region, between 2008 and 2017 the number of tourist nights increased by 92.4%. Considering the 2018 (when there was a change in the methodology), the number rose by 107.3% from 2008. In 2018, there were as many as 88 % of all overnight stays in the municipality of Ljubljana, while Municipality of Kamnik ranked second with 4%, which points to Ljubljana's dominance with regard to tourist overnight stays within LUR.

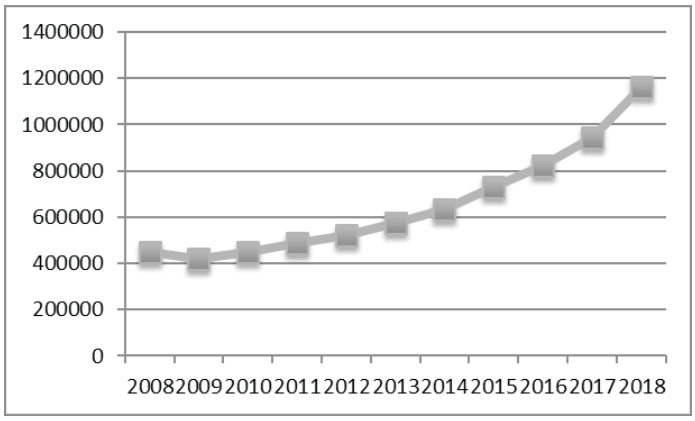

Figure 1: Tourist overnight stays in LUR between 2008 and 2018
Source: SURS, 2019.

Compared with Slovenia, in 2018, 13.7% of all overnight stays were made in Ljubljana. 93% of foreign guests stayed in the region in 2018 and 95% in the municipality of Ljubljana.

Tourist arrivals in LUR (Figure 2) increased by 110.6% from 2008 to 2017. By the year 2018 this increase was 158.8%.

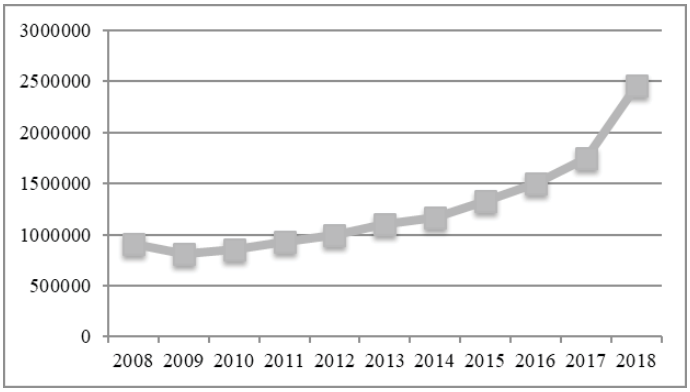

Figure 2: Tourist arrivals in LUR between 2008 and 2018
Source: SURS, 2019.

The majority of tourist arrivals in the region was recorded by the municipality of Ljubljana, as much as 88%; the Municipality of Kamnik with barely 3% came in the second place, suggesting that the Municipality of Ljubljana is the most visited municipality in LUR.

In 2018, LUR reached 19.5% of all tourist arrivals in Slovenia. The Municipality of Ljubljana had as much as 17.2% of all tourist arrivals.

The average length of stay in the region in 2018 was 2.1 days, in 2010 it was 2 days.

From the data it is evident that tourism in LUR has become an important economic sector. This is also confirmed by the fact that tourism generated 3.3% of national GDP in 2018.

Below, we will present some facts or reasons why tourism within LUR and also at the national level has grown as much as it did. We will conclude this with a tree analysis (Figure 5), where we presented the main causes and possible consequences for the growth of tourism in LUR.

LUR has a good geostrategic position, as it lies at the Mediterranean side of the European transport

corridor. Its central location means good accessibility compared to other regions in Slovenia.

The region is in the immediate vicinity of the international airport Jože Pučnik, and it is well connected with the airports in Klagenfurt, Graz, Trieste, Venice and Zagreb (all less than 2.5 hours away from Ljubljana). There are also good roads and rail links with neighboring regions. On the one hand, LUR boasts a well-developed business and holiday city tourism in Ljubljana (where foreign tourists are predominant). Nn the other hand, Ljubljana's mostly rural area with a plethora of smaller tourist and cultural attractions attracts mainly tourists (stationary tourism is less developed), but not in an organized way. Approximately half of the guests indicated business as the reason for their arrival in Ljubljana, while for the rest, Ljubljana is a classic holiday destination – a city break (Turizem Ljubljana, 2011).

Since the establishment of the Regional Destination Organization (RDO) in 2011, both the number of arrivals and the number of overnight stays increased in the region. New programs, products and catalogs were created (various regional guides - green stories of the region, tips for excursions, culinary guide, narratives, myths and legends from the region (RRA LUR, 2015).

Figure 3: Stritarjeva street – view on the Ljubljana Castle
Source: personal archive

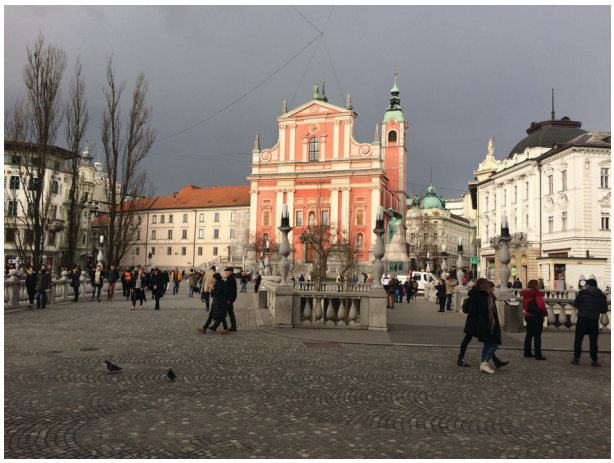

Figure 4: Tromostovje-Triple Bridge view of the Franciscan Church of the Annunciation
Source: personal archive

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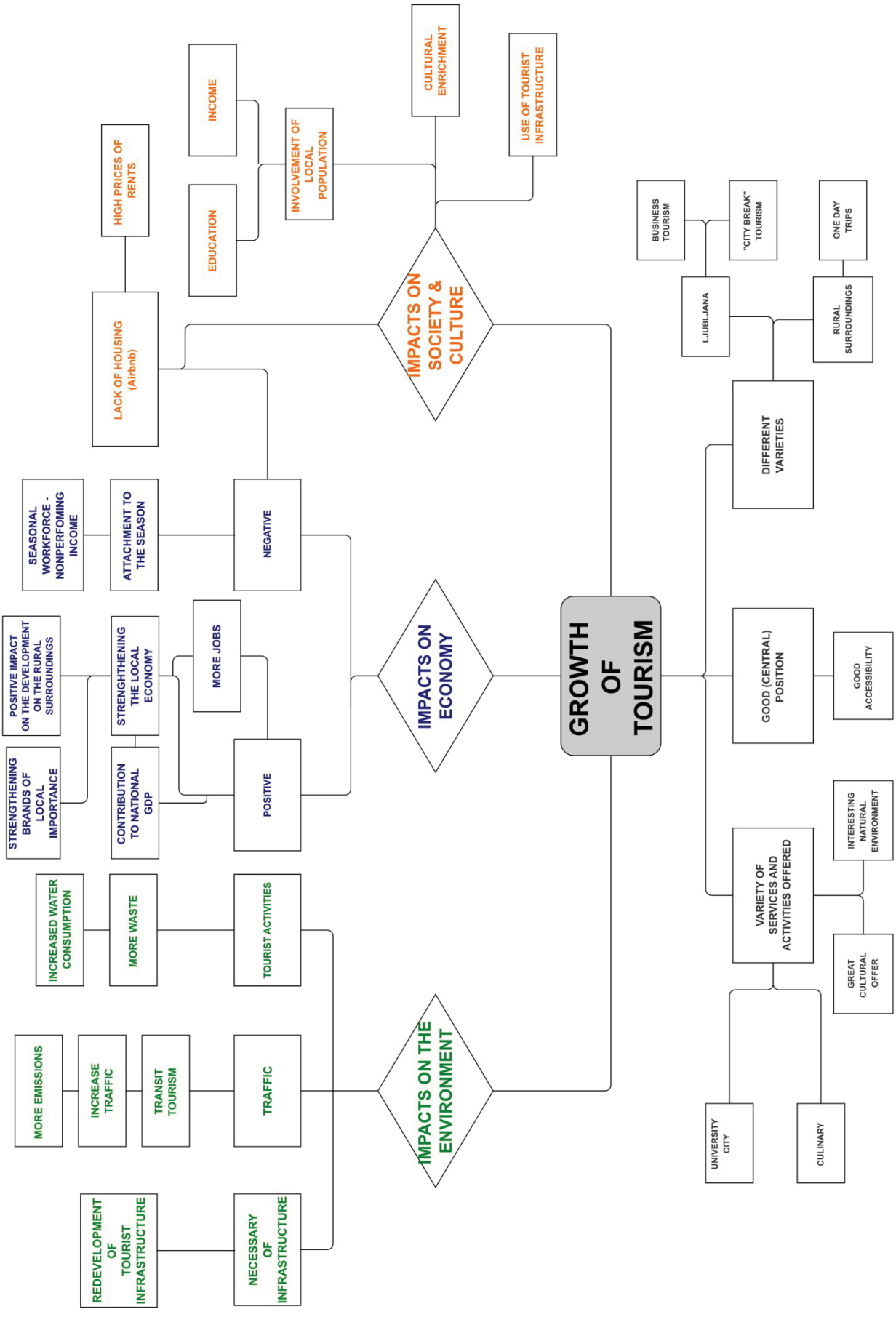

Figure 5: Tree analysis of growth of tourism in LUR

ECONOMY IN LJUBLJANA URBAN REGION

Ana Mestnik

Ljubljana Urban region (LUR) is the most economically developed region in Slovenia, as it generates more than 36% of the national gross domestic product (Figure 1). The region concerned has the highest gross domestic product per capita in Slovenia, which stood at EUR 27,644 per capita in 2017. The economic strength of the region is also indicated by the scheme of import and export (Figure 2). In both categories, the Osrednjeslovenska statistical region stands out with the same range as LUR, so the data are also representative of LUR itself.

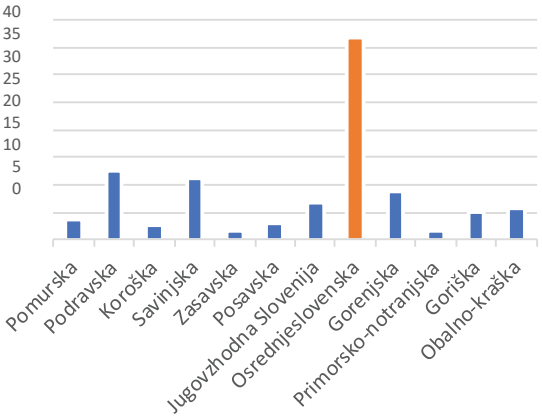

Figure 1: GDP by regions in 2017
Source: SURS, 2018.

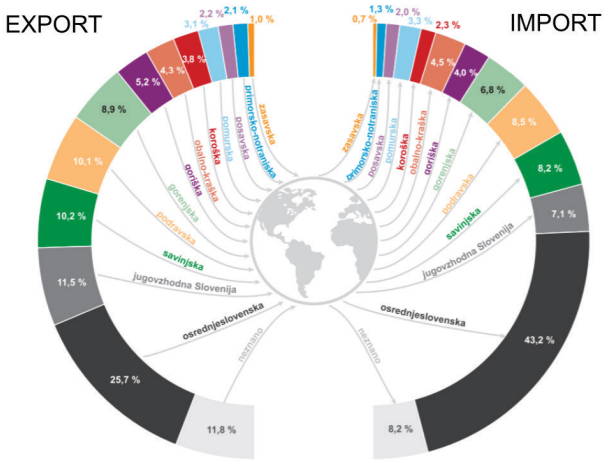

Figure 2: Import and export of goods
Source: Regije v številkah, 2018.

In 2017, 65,412 enterprises were registered in the region, which is confirmed by the fact that about one third of all Slovenian companies is located in LUR (Figure 3). The number of companies within the region is the most outstanding in Ljubljana, where 41,708 enterprises are identified. Consequently, the largest number of people working in companies is also in Ljubljana and the revenue is also the highest. Ljubljana is followed by Domžale, Kamnik, Grosuplje, and Medvode.

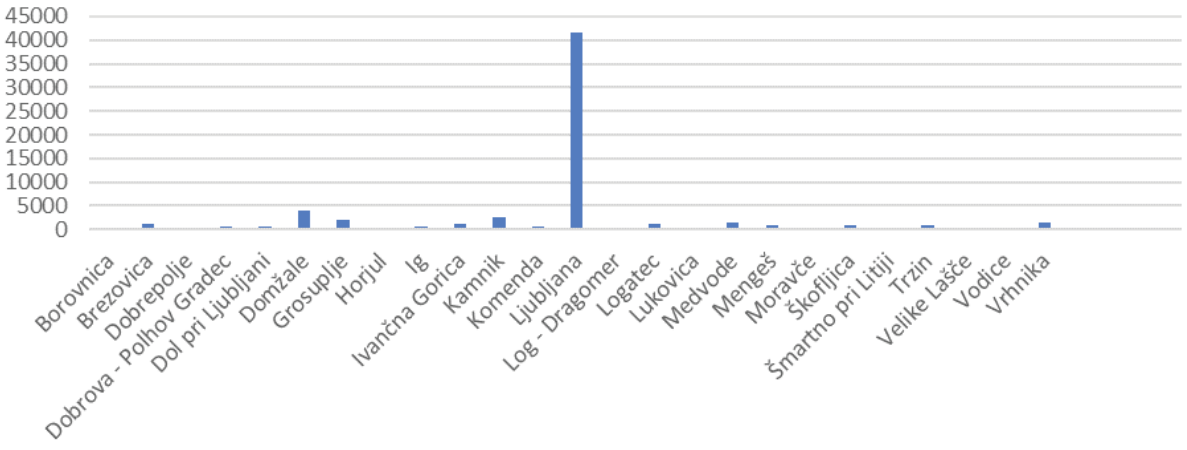

Figure 3: Number of enterprises by municipalities in 2017
Source: SURS, 2018.

In 2017, LUR's companies generated revenues of € 45,134 million or 46% of all Slovenian enterprises, and 26% of the total exports of goods and 43% of the value of total imports of goods. Table 1 shows the list of the twenty largest companies based in the region. Based on the company's total turnover, enterprise Petrol is in the lead, followed by Mercator, Lek, Interenergo, and Telekom Slovenije. The most intensive companies based in LUR are the companies with the largest number of employees (Table 2). Companies employing more than a thousand employees are: Mercator, Lek, Telekom Slovenije, Slovenske železnice, Hella Saturnus Slovenija and Petrol. Listed companies are based in Ljubljana, but all employees do not work in Ljubljana.

Table 1: Biggest enterprises in 2017

Enterprise	Total revenue [in mio EUR]	Profit [in thousand EUR]
Petrol, d. d., Ljubljana	3,790.7	64,273.0
Mercator, d. d., Ljubljana	1,205.6	-203,725.9
Lek, d. d., Ljubljana	998.9	83,179.5
Interenergo, d .o. o., Ljubljana	893.8	2,916.1
Telekom Slovenije, d. d., Ljubljana	662.6	1,719.6
Porsche Slovenija, d. o. o., Ljubljana	515.5	11,658.7
Uporabna Energetika, d. o. o., Ljubljana	500.0	1.7
Renault Nissan Slovenija, d. o. o., Ljubljana	478.8	4,833.2
Hella Saturnus Slovenija, d. o. o., Ljubljana	396.3	13,240.1
Geoplin, d. o. o., Ljubljana	345.4	6,258.4
Belektron, d. o. o., Ljubljana	304.9	2,384.4
Kemofarmacija, d. d., Ljubljana	304.9	6,090.7
DUTB, d., d., Ljubljana	248	66,985.8
Tobačna Grosist, d. o. o., Ljubljana	246.2	461.9
Sandoz, d. d., Ljubljana	232.0	6,116.7
Salus Veletrgovina, d. o. o., Ljubljana	231.8	3,704.3
A1 Slovenija, d. d., Ljubljana	216.2	11,482.7
Telemach, d. o. o., Ljubljana	196.5	-316.4
Shell Adria, d. o. o., Ljubljana	195.8	3,448.8
Avto Triglav, d. o. o., Ljubljana	194.3	2,021.6

Source: Delo

In addition to the fact that LUR is the first in terms of the number of companies, the share of high-growing companies in this region is also the largest. While the largest companies have their head offices in Ljubljana, the fastest growing companies are located in other municipalities in LUR. In addition to the prevailing number of companies located in Ljubljana, companies are also located in Trzin, Domžale, Komenda, Medvode and Škofljica. Approximately 23,600 people are employed in high-growth companies.

Table 2: Most labor-intensive companies

Companies	Number of employees
Mercator, d. d., Ljubljana	8,576
Lek, d. d., Ljubljana	3,569
Telekom Slovenije, d. d., Ljubljana	2,300
SŽ – Infrastruktura, d. o. o., Ljubljana	2,169
SŽ – VIT, d. o. o., Ljubljana	1,947
Hella Saturnus Slovenija, d. o. o., Ljubljana	1,527
Petrol, d. d., Ljubljana	1,439
SŽ – Tovorni promet, d. o. o., Ljubljana	1,203

Source: Delo

Table 3: The fastest growing companies in LUR

Company	Municipalities
Silk, d. o. o.	Trzin
Javna Razsvetljava, d. d.	Ljubljana
Mars Overseas Holdings, d. o. o	Ljubljana
Avtocenter Trobec, d. o. o.	Ljubljana
Korotaj, d. o. o.	Ljubljana
Reit, d. o. o.	Ljubljana
Sdh, d. d.	Ljubljana
Powercom Adria, d. o. o.	Ljubljana
Agencija 101, d. o. o.	Ljubljana
Sterk, d. o. o.	Komenda
Klinika Doktor 24, d. o. o.	Ljubljana
Tagro, d. o. o.	Ljubljana
Družina Krumpak, d. o. o.	Domžale
Kariera, d. o. o.	Ljubljana
Metalka Commerce, d. d.	Ljubljana
Dr. Duhovnik, d. o. o	Medvode
Trilijon, d. o. o	Ljubljana
Proaktiv Plus, d. o. o.	Ljubljana
Gitri, d. o. o.	Ljubljana
SoildWorld, d. o. o.	Ljubljana
Plamtex Int., d. o. o.	Komenda
BDT TM, d. o. o.	Ljubljana
Mediforma, d. o. o.	Ljubljana
Amstar, d. o. o.	Ljubljana
Rotra, trgovina, d. o .o	Škofljica

Source: Dnevnik

Larger economic zones in LUR are in Kamnik, Komenda, Trzin, Domžale and Logatec. With 75.4 ha, Komenda's largest Business Zone is followed by the Logatec Industrial Zone, which covers 73.1 ha. Since we were interested in the location of vacant land for production activities, on the basis of zoned and actual land use, we created a map (Figure 4) of unoccupied areas dedicated to production

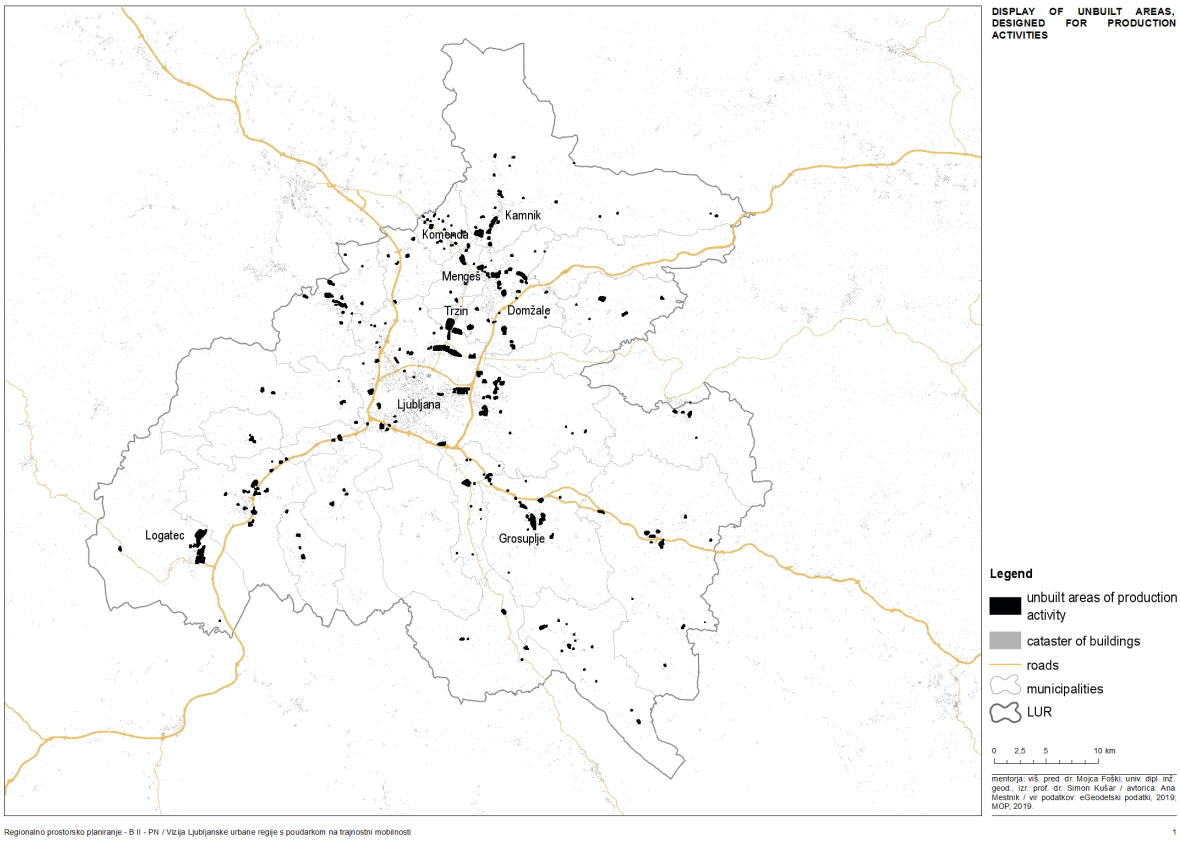

Figure 4: Display of unbuild areas, designed for production activities

activities. Large zones of vacant areas intended for industry in Ljubljana are the areas around the Jež Industrial Zone and the Logistics Center at Letališka street. Other major areas for production are in the municipalities of Logatec, Mengeš, Trzin, Domžale, and Grosuplje.

Services in LUR are predominant, i.e. trade, financial intermediation, business services, transport, public administration, and insurance. The above data on the predominant tertiary and quaternary activities are confirmed based on the number of employees in each activity. According to the Statistical Office of the Republic of Slovenia, the majority of the population, namely 70,194, is employed in administration, education and health, followed by catering, and trade with 65,650 inhabitants. A little over 50,000 inhabitants of the region are employed in professional, scientific, technical and other business activities. The tertiary and quaternary sectors follow secondary. In the manufacturing and other industries, there are 41,683 inhabitants and there are 14,814 in the construction sector. The least population (only 582) is active in the primary sector, including agriculture, fisheries, and forestry. The structure of employees in the region coincides with wages that are above the Slovenian average. In 2017, the average monthly gross earnings in LUR amounted to EUR 1,751. Ljubljana, Dol pri Ljubljani and Komenda stand out the most. The lowest salaries within the region are in the municipalities of Velike Lašče, Dobrepolje, and Šmartno pri Litiji.

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HOUSING POLICY IN LJUBLJANA URBAN REGION

Špela Zorko

HOUSING POLICY

The right to adequate housing is one of the basic human needs and rights. But because in Slovenia the purchasing power is too low, while property values are too high, for most people the road to owning a roof over one's head is much longer than in general (Štefančič, 2003). The fact is that residential areas are planned around town centers or major roads, which enable quicker access to activities and services. The housing policy in the region is very complex, because some areas are more developed regarding the accessibility to everyday activities and services. Furthermore, the housing market is additionally adapted to the needs and the purchasing power of people. The goal of this analysis is to examine the system of residential construction in LUR and its influential factors.

UNOCCUPIED FLATS

The number of flats in the municipality correlates to the activities within. In the LUR area, Ljubljana has the highest number of flats. According to the STAGE information for 2015, there are 126,938 flats in the City Municipality of Ljubljana, of which 23,496 are unoccupied, i.e. 18% of the flats.

There is a higher number of unoccupied flats in the municipalities with larger town centers, such as Domžale, Kamnik, Grosuplje, Logatec, Vrhnika, Medvode, and Ivančna Gorica. The percentage of unoccupied flats in these municipalities ranges between 14% and 18%, with the exception of Ivančna Gorica with 24%. A lower number of unoccupied flats is found in smaller town centers, such as Medvode, Velike Lašče, Ivančna Gorica, Horjul, Vodice, and Moravče. The percentages of unoccupied flats are more varied in the municipalities with a lower number of unoccupied flats. The lowest percentage of unoccupied flats is in the municipality of Vodice at 13% and the highest percentage is in the municipality of Velike Lašče at 28%. An occupied flat means it is owner-occupied, which excludes rental flats. Therefore, the information about unoccupied flats can be misleading, because rented and student flats are also included in the category of unoccupied flats, which is especially the case in the City of Ljubljana.

THE NUMBER OF AUTHORIZED BUILDING PERMITS PER 1000 RESIDENTS

The number of authorized building permits per 1000 residents represents the system of new construction in the municipalities. In LUR, 616 permits were authorized in 2018. The lowest index of authorized permits was calculated for the municipalities of Ljubljana, Domžale, Borovnica, and Dol pri Ljubljani, while the highest index was calculated for the municipalities of Dobre Polje and Komenda. There is a noticeable trend of immigrations to the edges of the LUR area, more specifically to smaller town centers. The reason for this trend is especially the real estate prices, which are significantly lower on the outskirts than in the center. Besides that, this area offers good access to places with concentrated employment.

UNOCCUPIED RESIDENTIAL AREAS

Unoccupied residential areas include areas for housing, specified by the purpose of their use regarding the Municipal Spatial Order (in continuation: MSO). The base for the work methodology is individual MSOs, which specify the land use in each municipality. We gathered information about the areas intended for housing for 22 municipalities, because the municipalities of Lukovica, Dol pri Ljubljani, and Ig do not have an authorized MSO. We classified unoccupied areas intendent for housing in regard to already built-up areas. Areas with a more diverse relief, such as the northern part of Kamnik, are not specified as areas intended for housing, because the relief poses a limitation. The unoccupied residential areas smaller than 100 ha are scattered throughout the LUR area while the unoccupied residential areas bigger than 100 ha are more concentrated (Figure 1).

Larger areas make a pattern, which is shaped around the motorway network and other major transport

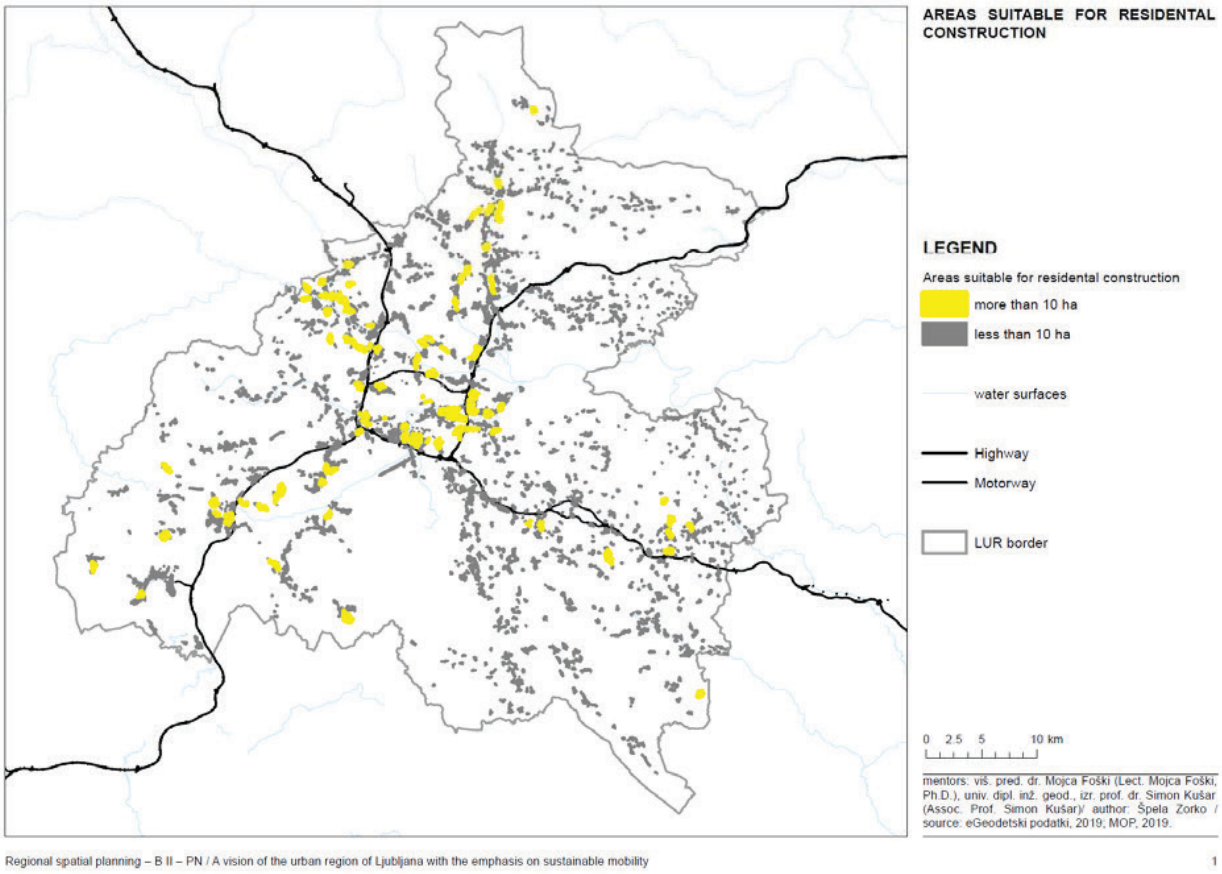

Figure 1: Areas suitable for residential construction
Source: e Geodetski podatki, 2019; MOP, 2019.

links between the town centers. A bigger part of the areas is in Ljubljana and it is stretched towards the northern part of the LUR area, especially towards the municipalities of Medvode, Komenda, and Mengeš. There are also a few larger areas located northwest of the region.

We calculated the surface of unbuilt construction land and the capacity of buildings it could hold for each municipality with larger areas of unbuilt construction land. We presumed the needed surface for the construction of a building is 400 m^2. The Municipality of Ljubljana has 391 ha of unbuilt construction land, which could hold 9770 buildings; the Municipality of Medvode has 112 ha of unbuilt construction land, which could hold 2810 buildings; the Municipality of Komenda has 19 ha of unbuilt construction land, which could hold 480 buildings; and the municipality of Mengeš has 29 ha of unbuilt construction land, which could hold 720 buildings.

ANALYSIS OF THE HOUSING MARKET

The work methodology is based on the model of mass evaluation of real estate properties, which is based on a sales comparison approach. It is comprised of different layers such as value zones, value tables, scoreboards, and other factors of value. The criterion of the chosen referential model for the evaluation is a flat: 50 m^2 of usable surface area, built between 1975–1984, with a balcony, and it has to represent an apartment in a three- or multi-apartment building. Value zones are divided into more levels of value and are determined by the location of the flat. Other features of a flat such as age, floor area, and additional rooms are evaluated based on the scoreboard and other factors of value (Register evidentiranja nepremičnin, 2019).

The value of flats highly depends on the location. The lowest values of flats are found in smaller town centers such as Velike Lašče, Logatec, and Kamnik. Lower values are conditional to relief, employment, and activity rates in the town center. In the zone with the lowest values of housing the value of 50 m^2 flats ranges between 25,300 € and 46,900 €. Higher values are most typical in Ljubljana and its vicinity and near the areas with high concentration of employment.

The fact is that in towns with a significantly higher demand for housing and construction land there is an issue with real estate prices, which are too high. In Ljubljana, the capital of Slovenia, the demand is extremely high, and this leads to higher real estate

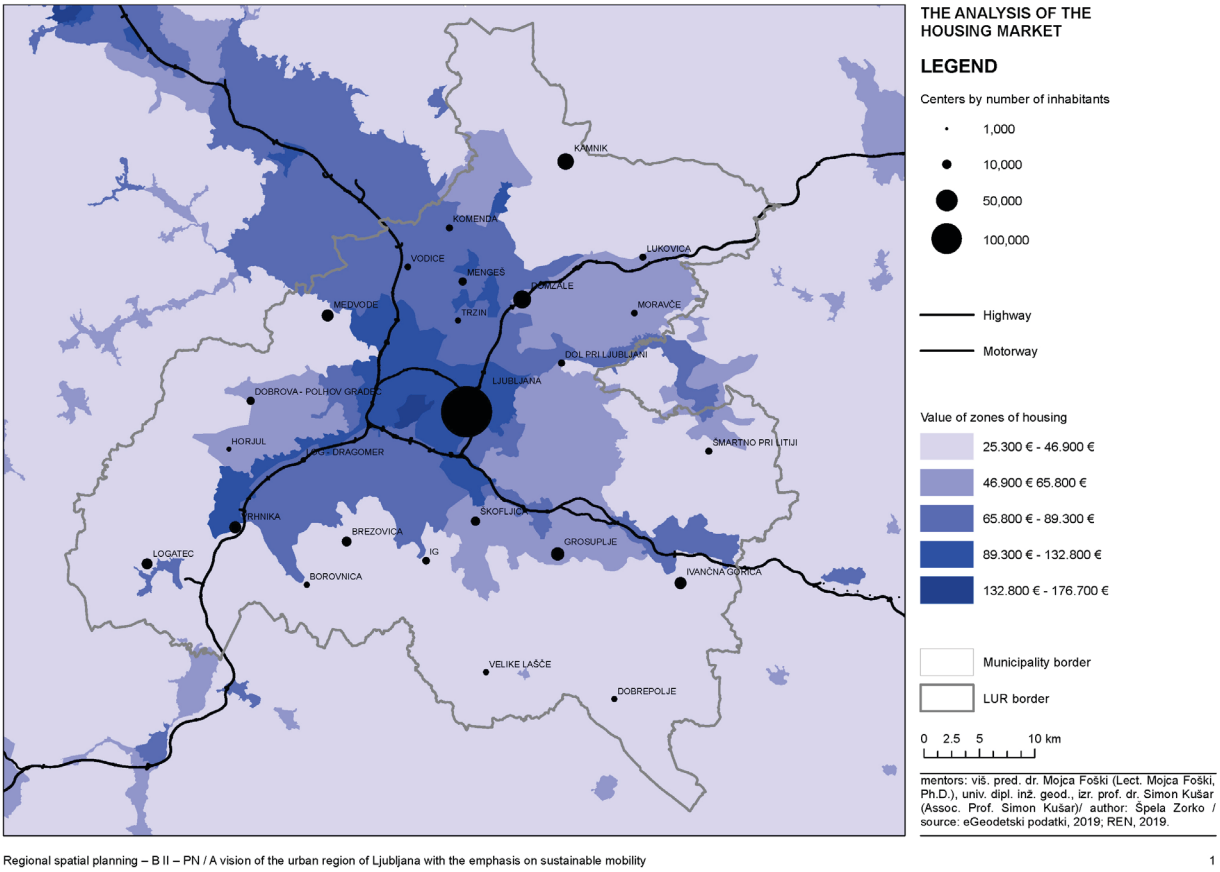

Figure 2: Analysis of the housing market
Source: e Geodetski podatki, 2019; Register evidentiranja nepremičnin, 2019.

prices. The value of flats in Ljubljana ranges between 132,600 € and 176,700 €, while in the vicinity of the city the value drops to a range between 65,800 € and 132,800 € for a flat with an area of 50m^2 (Figure 2).

CONCLUSION

The highest number of building permits was authorized in the LUR area, especially in the municipalities of Dobre Polje and Velike Lašče. These are also the areas with the highest percentage of unoccupied flats and with the lowest values of flats. The highest values of flats are in Ljubljana and its vicinity, which is correlated to the lowest number of authorized building permits. The percentage of unoccupied flats in Ljubljana is average in the LUR area. The distribution of residential buildings and their occupation depend mainly on the location. The analysis shows there's a higher number of flats in Ljubljana with consequently higher values, while the number and the value of flats both gradually drop with distance from Ljubljana and other larger towns. The analysis of authorized building permits shows that in the last years, most of the building permits were authorized in the edges of the LUR area, since they are somewhat distant from larger towns, and the real estate values are consequently lower. Transport links have the biggest influence on the distance. The main traffic link in the LUR area is the motorway network, which connects Ljubljana to other larger towns. There is a pattern of higher real estate values near motorway junctions. Unbuilt construction land is also planned around major transport links for better accessibility and better connection of larger towns.

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ENVIRONMENTAL ISSUES IN LJUBLJANA URBAN REGION

Jana Breznik

MOST PROBLEMATIC ENVIRONMENTAL ISSUES IN THE REGION

In the year 2007, there was big environmental research about the most problematic environmental issues. Since then the issues are still the same, but mostly we can see small improvements from year to year. Main problems are:

- High emissions from traffic and an increase in noise in the city center of Ljubljana and near the highway.
- Pollution of some water bodies and occasionally groundwater pollution
- Increasing loads on some water catchment areas and at water pumping stations
- Wild landfills
- The big environmental footprint of the population. (Plut, 2007)

These environmental burdens are focusing on problematics from all sectors. Since we are dealing mostly with traffic, we will focus mainly on problems with emissions and therefore air pollution and noise in the city center and along the highway.

AIR POLLUTION

Air pollution is the biggest problem, caused mainly by traffic in LUR. We are mainly dealing with problems from gas ozone – O_3 and with aerosol particles PM 2.5 and PM 10. These air polluters are the only ones whose concentrations are not decreasing, despite country (and region) actions for reducing air pollution (ARSO, 2019).

We also have a problem with air pollution measuring. In the region all the measuring stations are inside big cities, so we have only a few measuring systems inside of Ljubljana city. Therefore, research in the

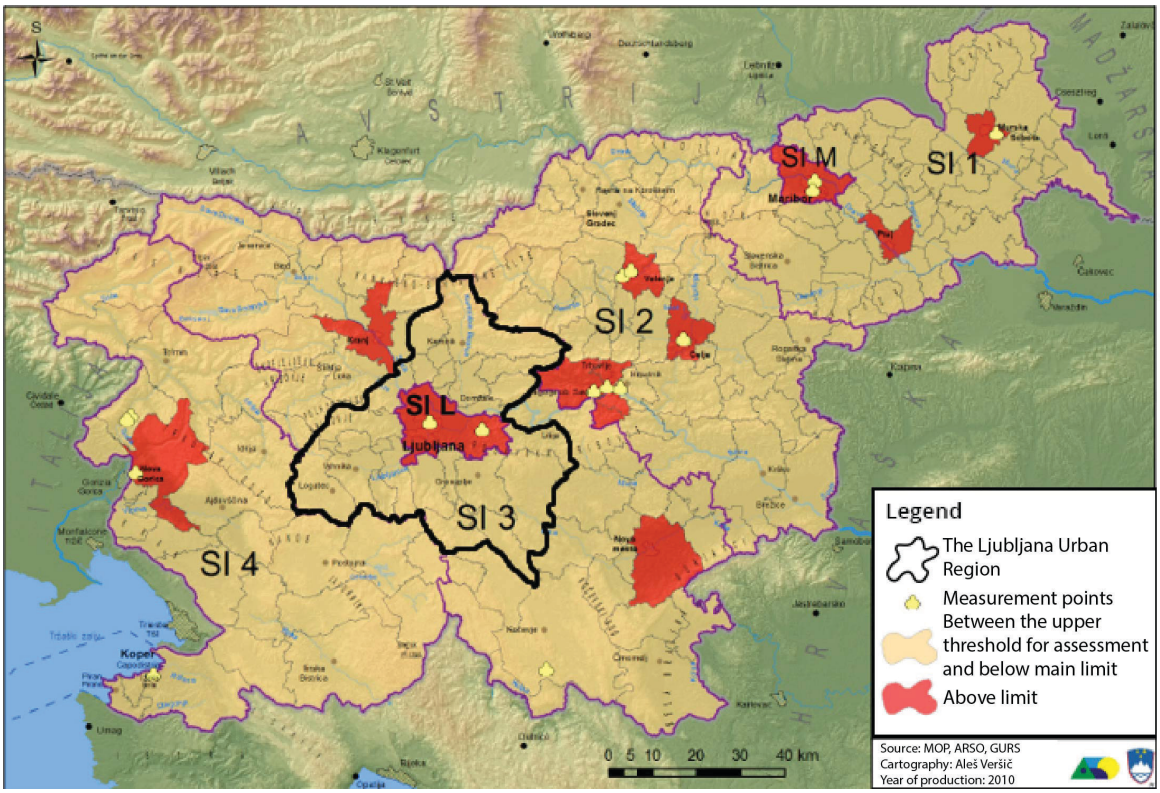


Figure 1: PM 10 meausurment in Slovenia
Source: ARSO, 2010.

region is focused mostly on Ljubljana. Other areas are covered with interpolation, which is not the most reliable method for representing problematics.

To understand this topic more deeply we made a problem tree (Figure 2), which represent sources of air pollution and its impacts. As the main problem, we recognized traffic emissions which we split into personal and freight traffic. They are so problematic especially because of lack of good railways and unsatisfactory public transport. All this leads to health problems, more fog, and deterioration of traffic safety.

NOISE

Second problematic that we were dealing with is noise. WHO (World Health Organisation) standards for noise are based on sound power. During the daytime, the sound of transportation system should not overcome 54 dB and during night time limit for sound, power is 45 dB (Environmental…, 2018). 54 – 55 dB is normal communication sound (if we are listening to people talking). In Map 1 we show day and night loads with noise. Sadly, also on this topic we only have data for Ljubljana municipality, where noise is measured more often.

Map 1 shows that the main noise sources are roads, railway, and industry. As we can see noise has the highest value (around 90 dB) just near the highway ring and towards all the highway directions. And from the biggest roads noise is lowering towards inside or outside of the city. Differences between day and night are well seen in the first two pictures. Even at night, sound at the highway is around 85 dB. During the day, most of Ljubljana Municipality is above WHO limits and could cause health problems.

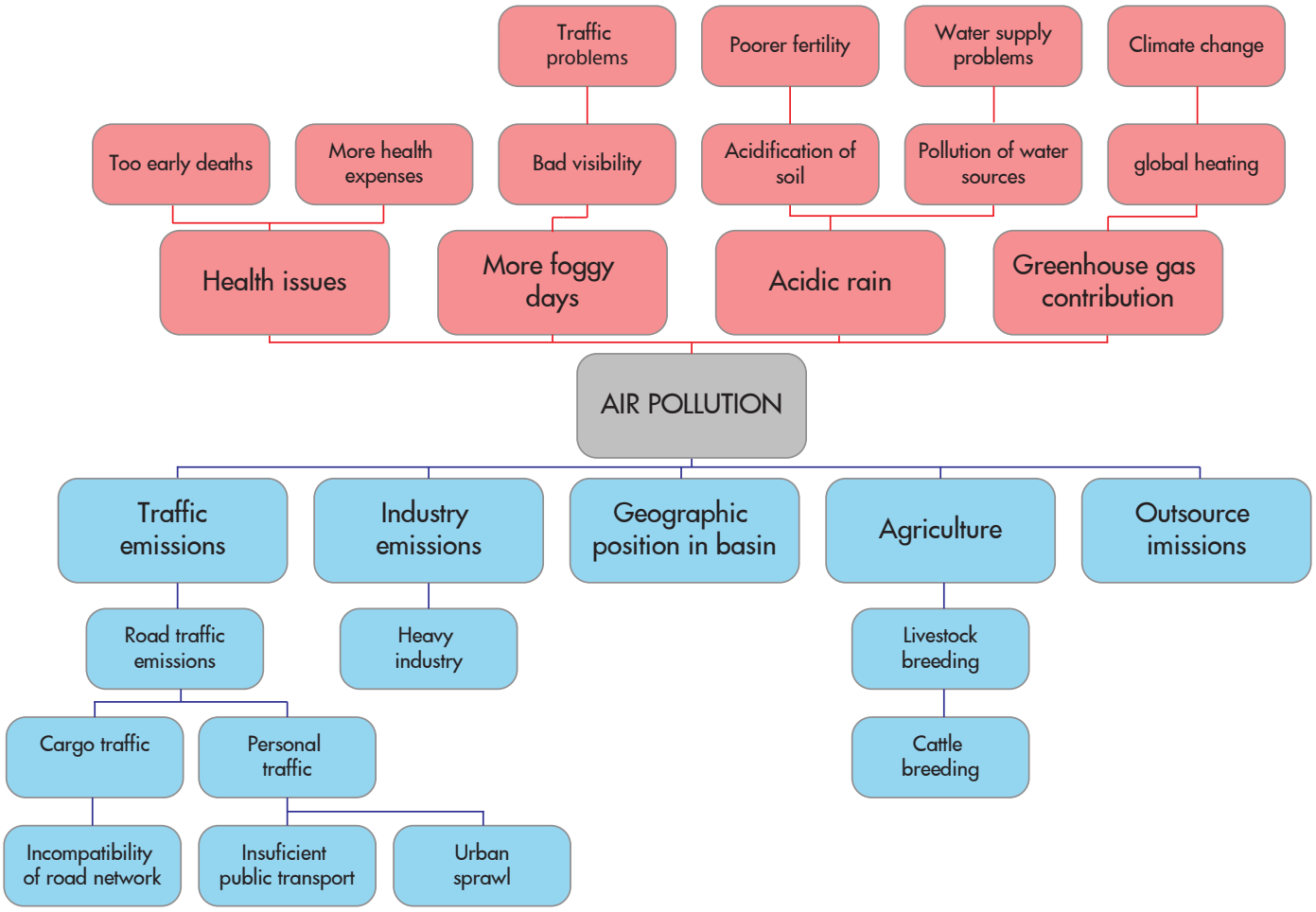
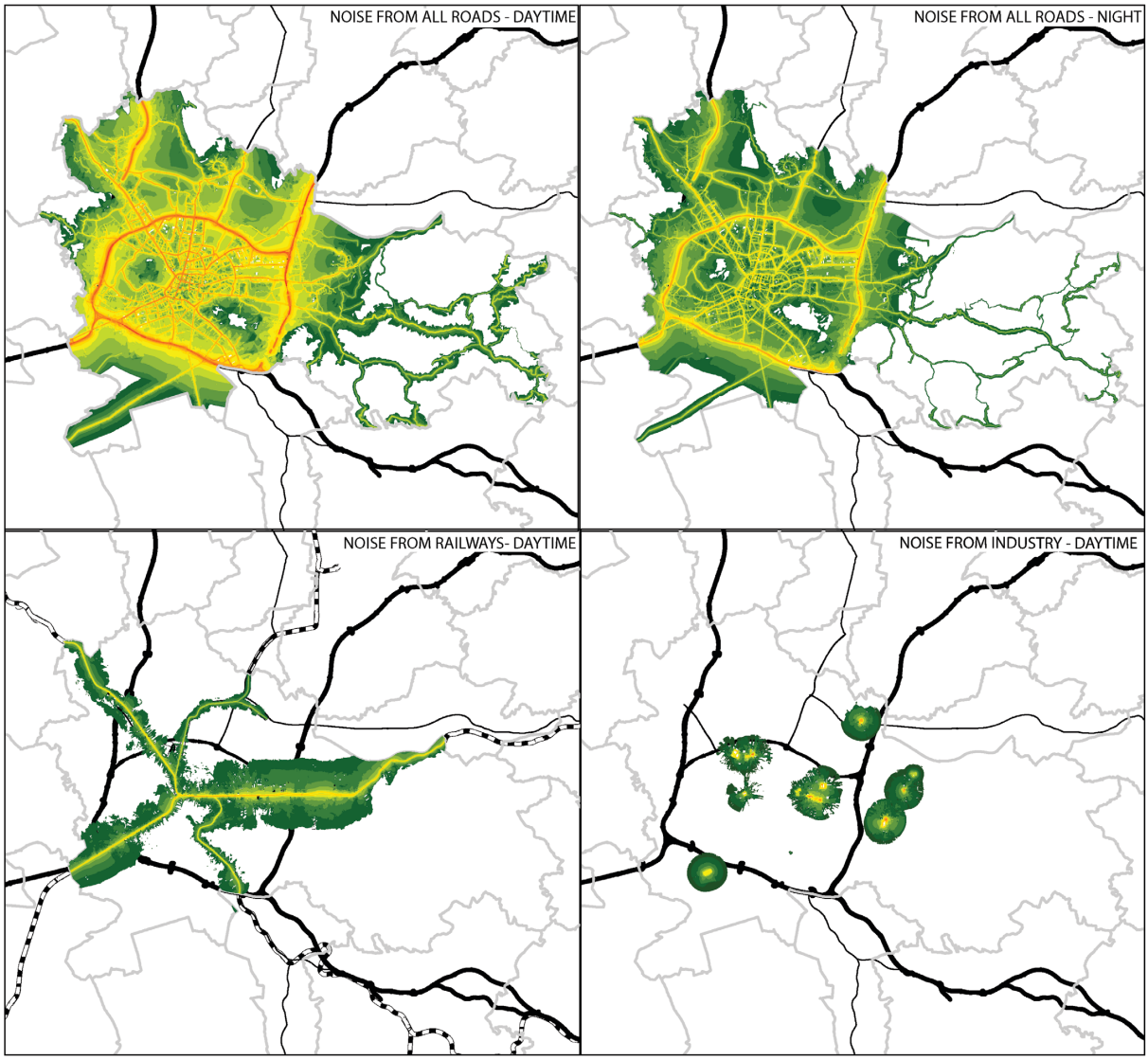


Figure 2: Air pollution problem tree

NOISE IN LJUBLJANA



Menthors: prof. Mojca Foški, PhD and Simon Kušar, PhD; Sources: GURS, 2019; ARSO, 2019; Cartography: Jana Breznik

Map 1: Noise in Ljubljana

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OCENA ONESNAŽENOSTI ZRAKA z žveplovim dioksidom, dušikovimi oksidi, delci PM10, ogljikovim monoksidom, benzenom, težkimi kovinami (Pb, As, Cd, Ni) in policikličnimi aromatskimi ogljikovodiki (PAH) v SLOVENIJI. ARSO. Availabel at: https://www.arso.gov.si/zrak/kakovost%20zraka/poro%C4%8Dila%20in%20publikacije/Ocena_kakovost%20zraka2010.pdf (Accessed: 16 June 2019).

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THE LJUBLJANA URBAN REGION (LUR) VISION
»*LUR CONNECTS*«

Anja Judež, Petra Kurnik, Ana Mestnik, Špela Osolin and Špela Zorko

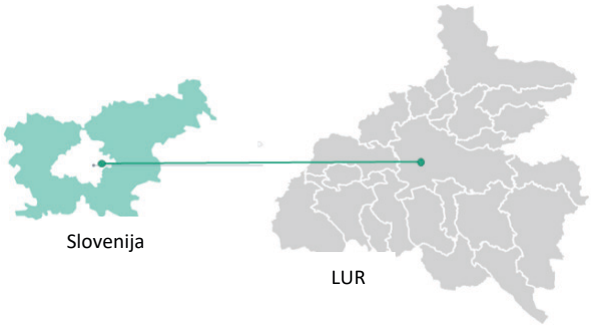


Figure 1: Geographical placement of LUR

INTRODUCTION

In this paper we will present a vision for the further development of the Ljubljana Urban Region (hereinafter: LUR) by year 2035, with an emphasis on sustainable mobility.

LUR has an exceptional strategic position on a national and European scale. It is located in the center of Slovenia (Figure 1), the economic, administrative, political, scientific and cultural center of Slovenia (Ljubljana), and at the same time a meeting point of important international transport corridors. It consists of 25 municipalities and the Region comprises 2,334 km², representing 12% of Slovenian territory. According to the latest statistics data, LUR has 537,893 inhabitants, which is a quarter of the population of Slovenia. The region generates almost 36.5% of the total Slovenian gross domestic product.

Like any developed region, LUR also faces a number of developmental challenges. Due to the many commuters to economic centers, especially Ljubljana, it has problems with high traffic loads, which have a negative impact on the environment and quality of life. Therefore, the vision of LUR's development is directed towards sustainable mobility.

1.1. Definition of sustainable mobility

Sustainable mobility is a way of moving, which puts forward aspects of sustainable development into the forefront. This includes walking, cycling, using public transport, and alternative forms of mobility. This form of mobility strives for an efficient flow of people and goods paired with a minimum negative impact on the environment. By achieving the goals of sustainable mobility, we contribute to reducing greenhouse gas emissions, cleaner air in cities, higher quality of life, public health, and social justice. In addition to reducing pollution, the main goal of sustainable mobility is accessibility. Efficient and equal accessibility for all is highlighted, with the emphasis on limiting personal motor traffic and energy consumption and promoting sustainable travel modes.

1.2. Methodology

LUR's vision was based on previous analyzes in the first phase of this project. Throughout these analyzes, certain deficiencies and advantages were detected, and we found it necessary to develop them further. The conditions for shaping the vision were that rather than burdening ourselves with the restrictions imposed by financial resources we try to think out of the box. Graphics was created using ArcMap and Inkscape.

AREAS AND GOALS OF DEVELOPMENT

Areas of LUR's development are shown on a pyramid scheme, which represents a hierarchical sequence of achievement of the development goals

set. In Figure 2 the main areas of development are represented, of which the goals (stay, economy, nature, and transport as the connection between the three) are developed, followed by the desired final results, i.e. an efficient transport policy with corresponding development goals. The desired final state is presented in the pyramid head. In our case, this is a coherent (spatial) development of LUR with an emphasis on sustainable mobility.

We identified 4 main development goals:

- regulation of the transport system emphasis on intermodality
- reduction in cargo traffic
- promoting sustainable travel ways and
- minimum impact of traffic on the environment

On this basis, we designed sub-goals, which we divided into two categories, namely the goals of passenger traffic and the goals of cargo transport.

The goals of passenger transport are (Figure 3):

- the overall design of public transport (PPT) functional system at the regional and interregional level
- the establishment of a suburban rail system
- free use of PPT at the regional level
- promotion of motor vehicles for non-fossil fuels
- car sharing system in the region
- P + R parking systems (a wider upgrade of the already well-developed system in Ljubljana)
- change in the habits of the inhabitants

The sub-goals of the change in travel habits of the population were divided into the following groups (Figure 4):

- at settlement level: on foot 40% / bicycle 30 % / PPT 20% / car 10%,
- at regional level: PPT 70% / bicycle + on foot 20% / car 10%

Figure 3: Goals of passenger traffic

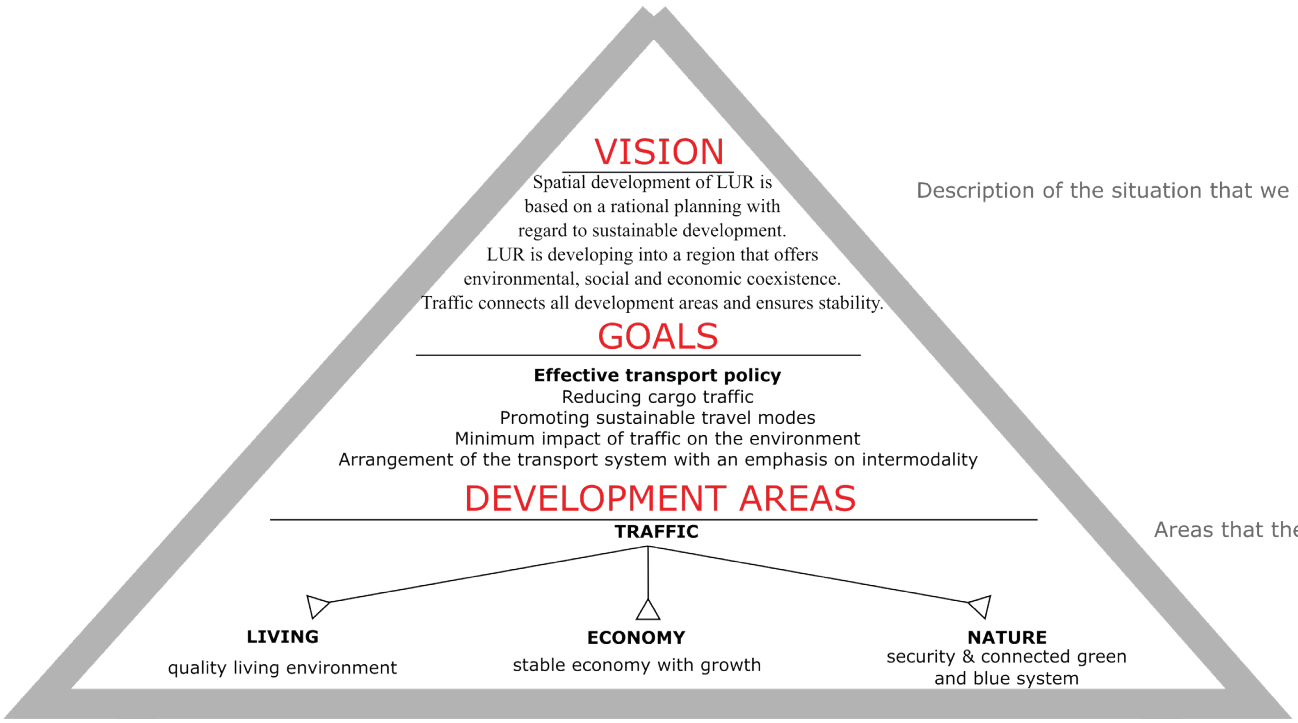


Figure 2: Scheme of area of development

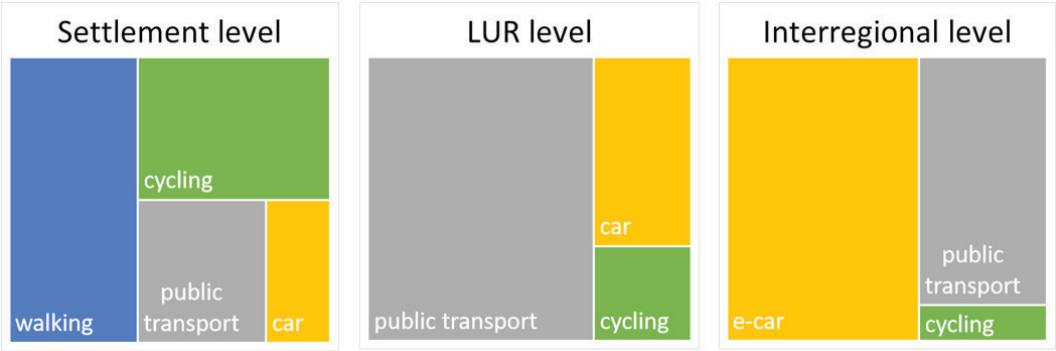


Figure 4: The sub-goals of the change in travel habits

- at interregional level: car 60% / PPT 35% / bicycle 5%

At national level, the car will continue to be the dominant choice by 2035, but with more environmentally-friendly electric cars, rather than cars for fossil fuels.

The goals of the cargo transport are (**Figure 5**):

- redirecting freight traffic from the road to the rail
- modernization of the railway infrastructure
- the creation of a central transport and logistics center within the region (Medvode)
- the restriction of road cargo transport

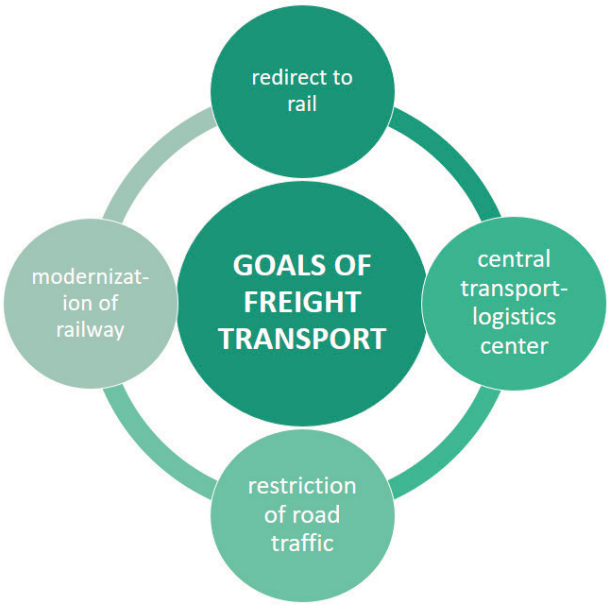


Figure 5. Goals of freight transport

3. VISION OF DEVELOPMENT

3.1. Slogan »*LUR Connects*«

LUR's spatial development is based on rational planning of mobility with regard to sustainable development. The vision includes the areas of living, economy and nature, which are connected by transport. It was precisely this interconnectivity of the various segments that influenced our decision to make ***"LUR connects"*** as the slogan of LUR's vision.

The scheme (logo) presents various systems that intertwine (Figure 6). Yellow represents areas of living, green represents nature, blue stands for economy, and gray for transport.

The contacts of various spatial systems on the logo can also be interpreted as the very points of intermodality within the concept of sustainable mobility - these are points of connection and transition, both between transport means or between spatial systems (living, business, and nature). Adding the slogan "LUR Connects", we can treat space comprehensively, covering three areas of space and traffic, as a key link between them.

3.2. Vision

Sustainable mobility is achieved by changing travel habits and public passenger systems. However, sustainable mobility is not solely related to transport, but is achieved in various ways, through balanced polycentric development, the allocation of functions, the strengthening of local centers, the promotion of certain working methods and housing policies.

Figure 6. Logo of LUR

a) Distribution of settlement functions in LUR

In order to achieve the set goals, we strengthen the local centers and balance the functions of the settlements (Figure 7). Ljubljana is preserved as a center of national importance but will be relieved of a balanced development around its territory.

All municipal centers will keep central activities, but settlements will have a predominantly residential function. The centers of intercommunal significance, Logatec and Komenda, will have a predominantly economic function, Škofljica a residential function and Medvode has a predominantly communication function. Centers of international, national and regional importance will be settlements with predominantly central activities.

There will be common regional zones, in which both service and production activities will be placed, thus ensuring the long-term needs of the

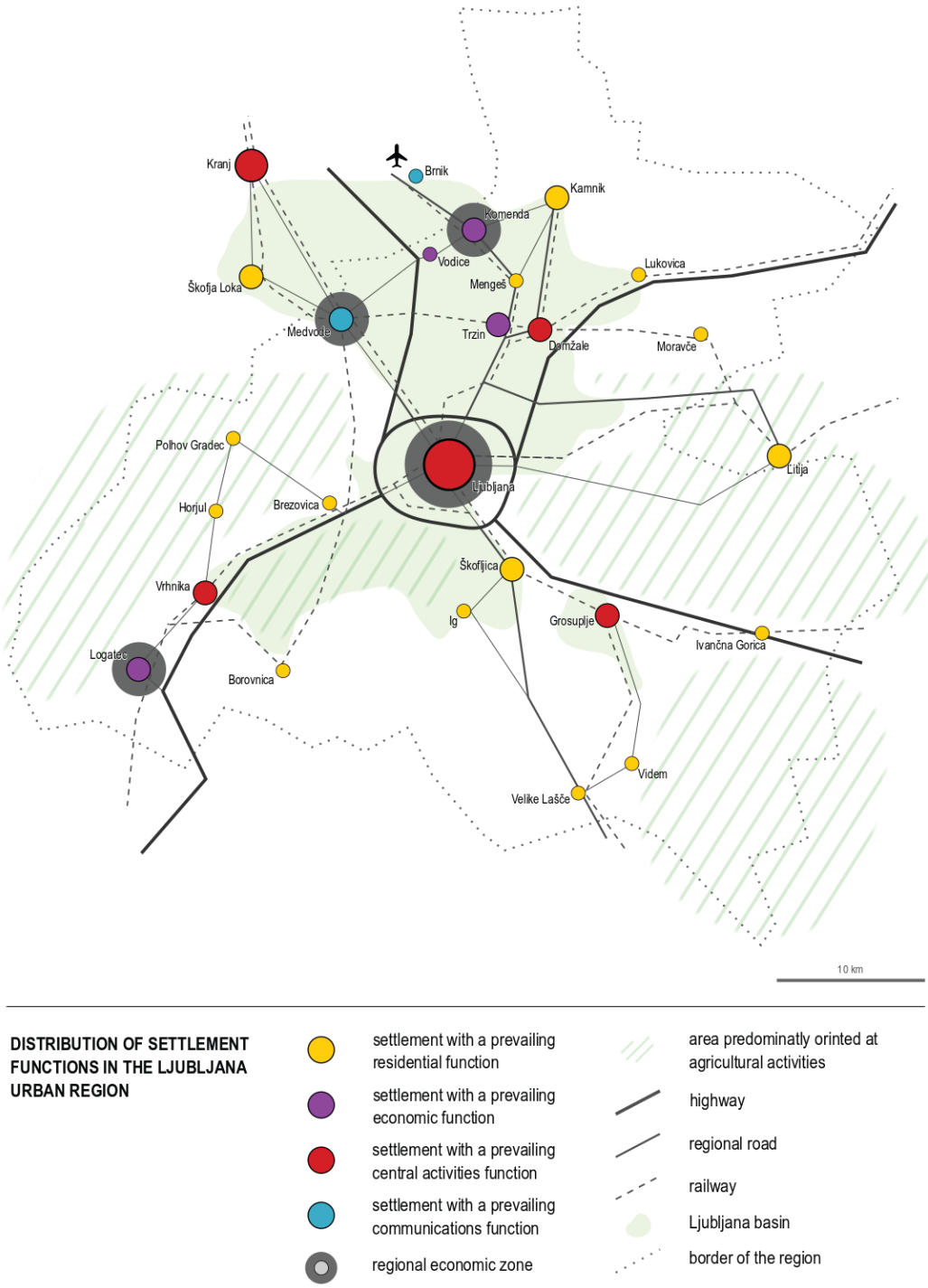


Figure 7. Proposal of distribution of settlement functions of LUR

regional economy. The zones will be managed at the regional level, since the aim of economic policy is to present LUR to Central European space as a single and diversified economic cell. In this way, the competitiveness of the region will increase in the European area.

b) Hierarchy of settlements

The settlements were hierarchically classified based on the objectives set and the distribution of functions aiming at a balanced development (Figure 8). Ljubljana as the capital of the Republic of Slovenia will maintain its leading position in the region as a center of international importance.

The town of Kranj, which lies outside LUR but nevertheless has a great influence on the region itself, is defined as a center of national importance. Grosuplje, Vrhnika and the Domžale - Kamnik conurbation will be developed as centers of regional

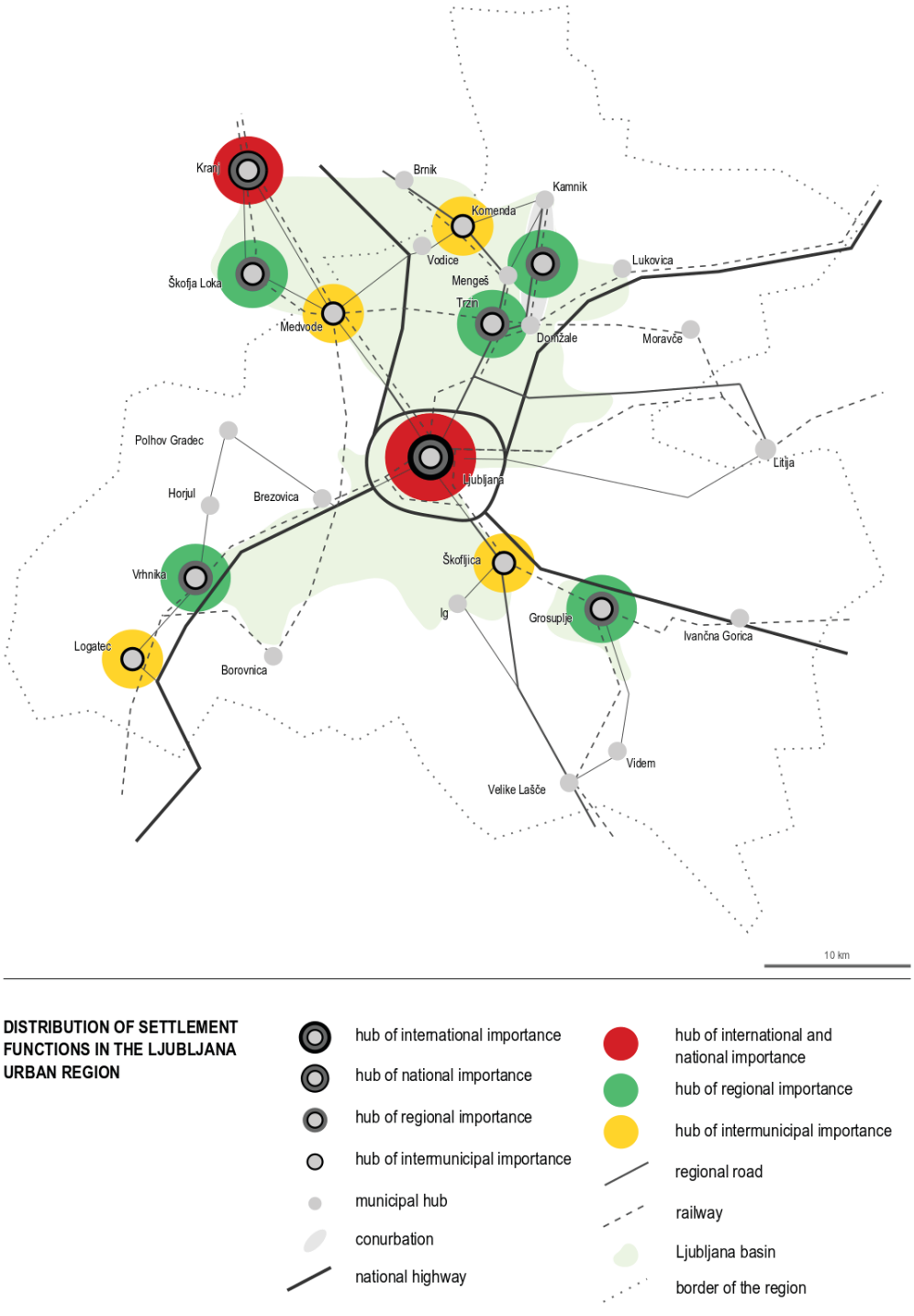


Figure 8. Proposal hierarchy of settlements in LUR

importance. Centers of inter-municipal importance, will be Komenda, Medvode, Logatec in Škofljica. The lower levels in the hierarchy of settlements also have municipal centers.

c) Green system

The objectives of sustainable mobility will also be achieved through the effective planning of LUR's green and blue system - across both systems, a regional cycling network will be routed through the regional regions of the region, which will connect all the local centers of the region (Figure 9). In addition to the traffic, the well-developed bicycle network will also have a recreational function in the region.

The hills and more diverse areas in LUR will also be intertwined with a network of footpaths and biking

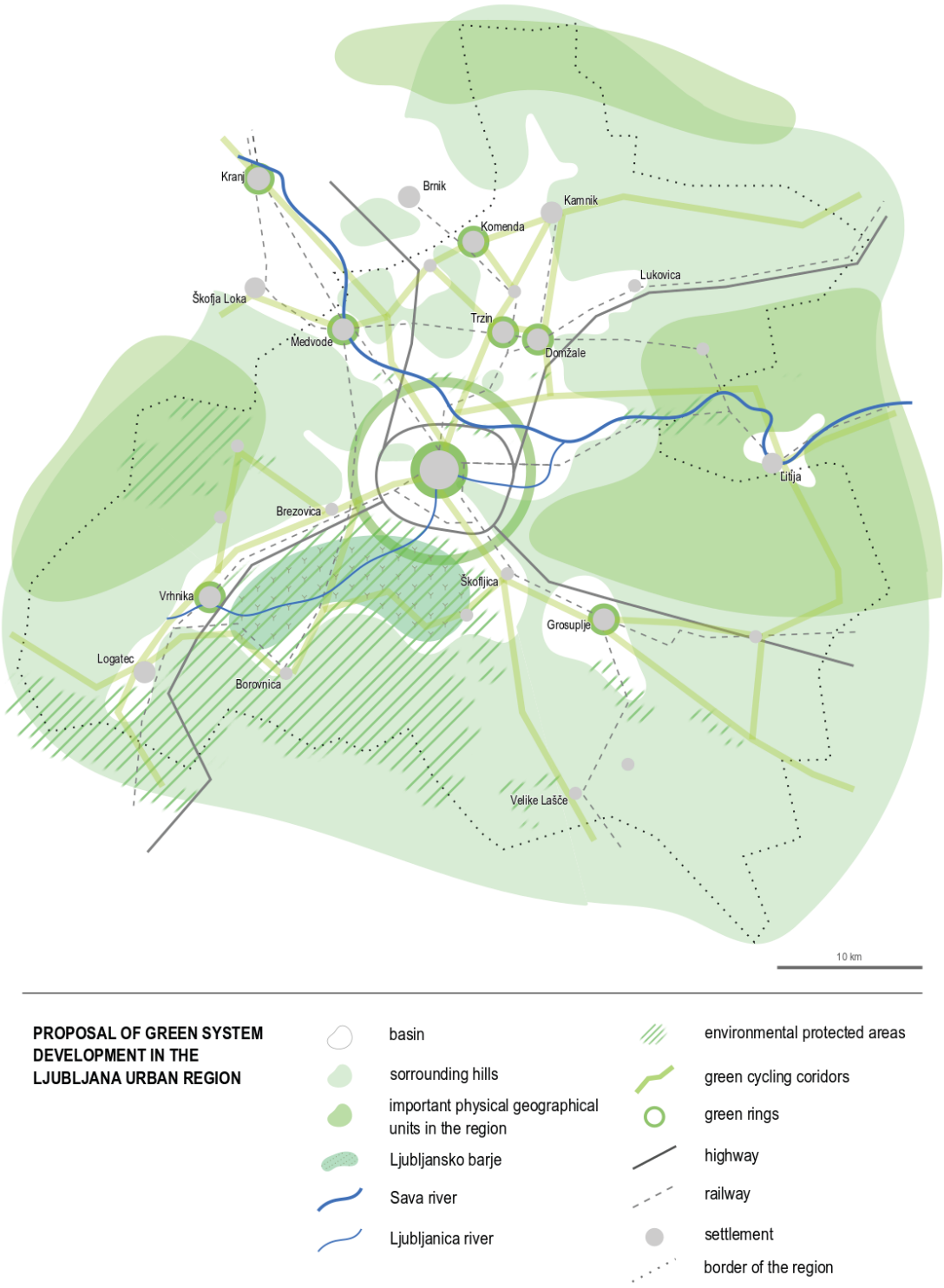


Figure 9. Proposal of green system in LUR

trails, thus connecting all the region, including those most difficult to access.

Large geographical units, such as the Kamnik-Savinja Alps, the Posavje Hills and the Polhov Gradec Hills and Barje, are not a spatial barrier, but a potential that offers the inhabitants of the region an area of well-preserved nature and recreation.

Genuine and pristine green and blue systems are priorities by 2035, therefore we propose further protection of Natura 2000 sites and landscape parks in the region. For a higher quality of the living environment, we will provide green rings around the largest agglomerations, and thus offer the inhabitants of the most urbanized regions quick and easy access to the green areas.

d) Rural area

The Green System is also understood as an area of agricultural activity (Figure 10). We promote diverse forms of farming, above all, we want to encourage

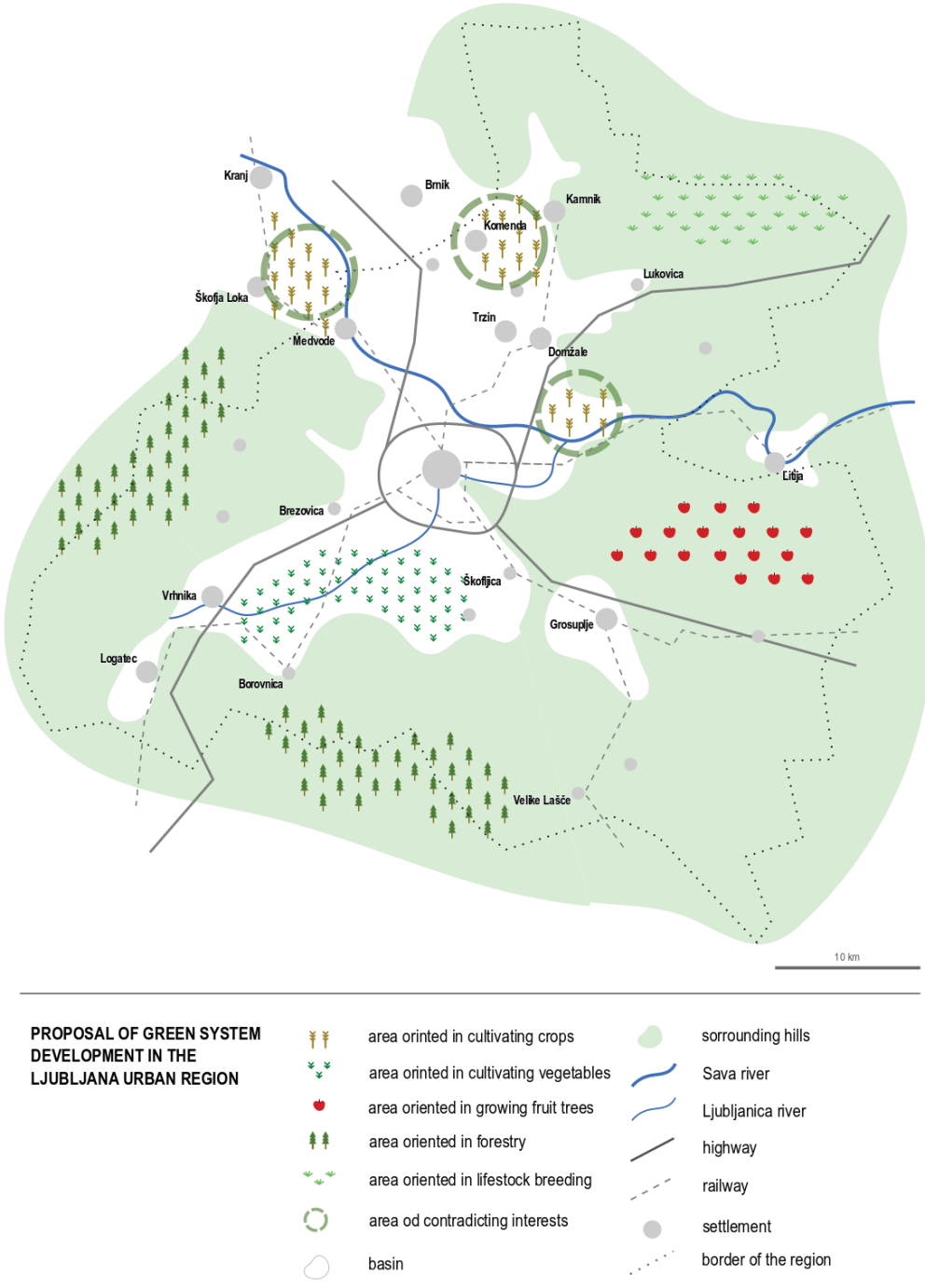


Figure 10. Proposal of rural area development in LUR

gardening and food production as a complementary activity. Like the traffic distances themselves, we also want to optimize the path of food "from field to plate", which means that we encourage local organic farming, thus reducing additional travel of people to commercial providers, while at the same time preserving the landscape of the_region. As other forms of agriculture in the region, we intend intensive agriculture in Mengeš, Sora and Zalog fields, growing vegetables in Ljubljansko Barje, fruit growing and dairy farming in the Posavje hills, dairy farming in the mountains under the Kamnik-Savinja Alps and forestry in the Polhov Gradec Hills.

e) Traffic

Within the framework of the transport vision we discussed various networks, namely road, rail and cycling. The development of transport will be based on sustainable mobility. The goal of the vision of the transport network is to ensure enough choice between the various sustainable forms of mobility (Figure 11).

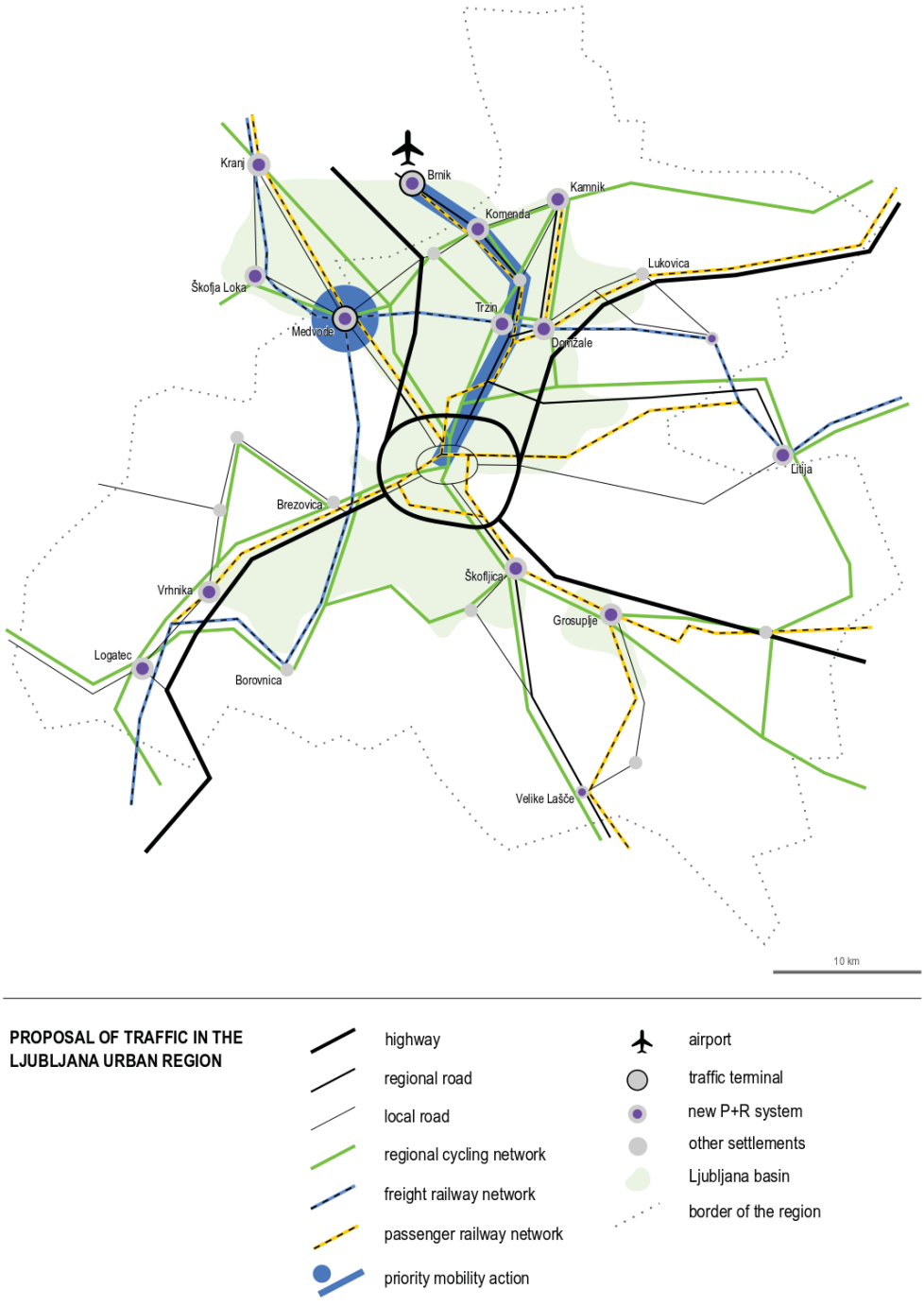


Figure 11. Proposal of traffic development in LUR

The comprehensive design of the railway network connects the settlements of higher levels (international, national, regional, intermunicipal center). A passenger railway route (suburban system) and a freight train route will be established. Freight rail transit will no longer cross the center of Ljubljana, but will be moved outside the motorway ring around Ljubljana with the establishment of a new terminal in Medvode.

Only passenger rail transport will take place in the center of Ljubljana. In order to solve the problem of radial connections in the center of Ljubljana, a ring of the passenger railway route will be established around the center of Ljubljana. A suburban railway system will be established, linking larger settlements in the Ljubljana gravity background (all the way to Novo mesto, Postojna, Kranj, Celje).

In Ljubljana and its immediate surroundings, especially within the motorway ring, P + R systems are already in place, and they operate efficiently. Therefore, new P + R systems will be installed in a wider network connection at all major intermodal points along the routes themselves, between the various means of transport. This reduces motor traffic and allows the use of PPT (rail or bicycle) in one's home town or the first possible entry. The intensity of commuting to and from LUR is also decreasing through the allocation of functions and activities in settlements in the region and by encouraging work from home.

There are no major changes in the road network, as investments in cycling and, in particular, railway infrastructure seem to be more important for achieving the goals of sustainable mobility that we have set ourselves.

The appropriate cycling infrastructure with organized and safe cycling network is a prerequisite for the greater use of bicycles as a means of transport replacing the car.

Due to the plane relief and the relatively short distances between the services in LUR, cycling has a great potential, therefore the network of cycling trails runs all over the Ljubljana basin. In addition to this, we avoid crowds and congestion during traffic peaks.

Green surfaces play an important role, as they offer quality leisure time and generally raise the living standard, so cycling routes and footpaths will be linked to the blue and green system of the region.

By moving towards sustainable forms of mobility, a reduction in greenhouse gas, noise and particulate emissions will also be achieved.

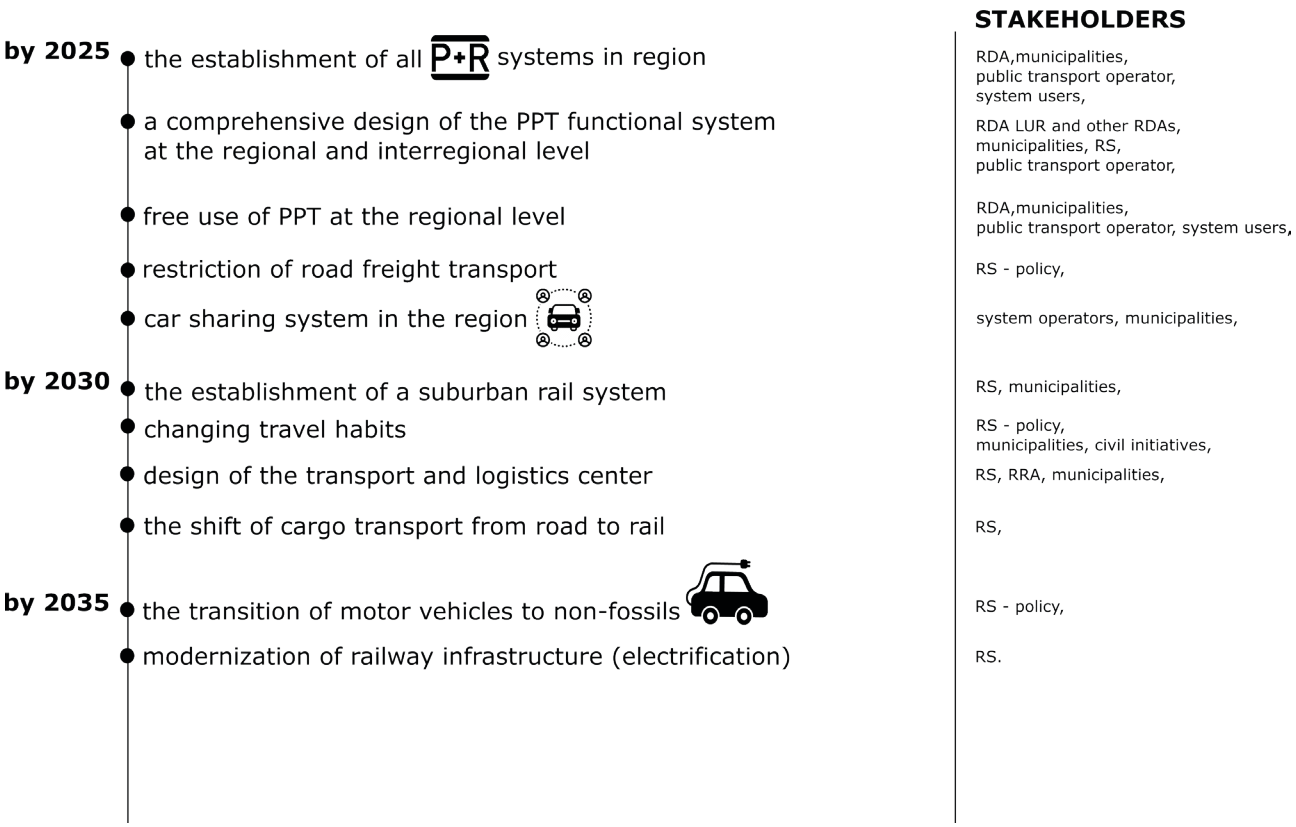


Figure 12. Timeline for achieving goals

The following scheme (Figure 13) combines all areas of the development. The basic segments of our vision are presented, in which we strive to develop sustainable mobility in the region.

4. TIMELINE FOR ACHIEVING THE GOALS

The timeline is divided into five-year phases (Figure 12). The timetable contains the planned measures in the field of transport infrastructure. By 2025 we anticipate a restriction of road freight traffic and the possibility of free use of PPT. In the period up to 2030, rail will be established for both passenger and freight transport. In the last five-year period of vision, besides the modernization of the railways, measures will be implemented that will enable the transition of motor vehicles to non-fossil fuels.

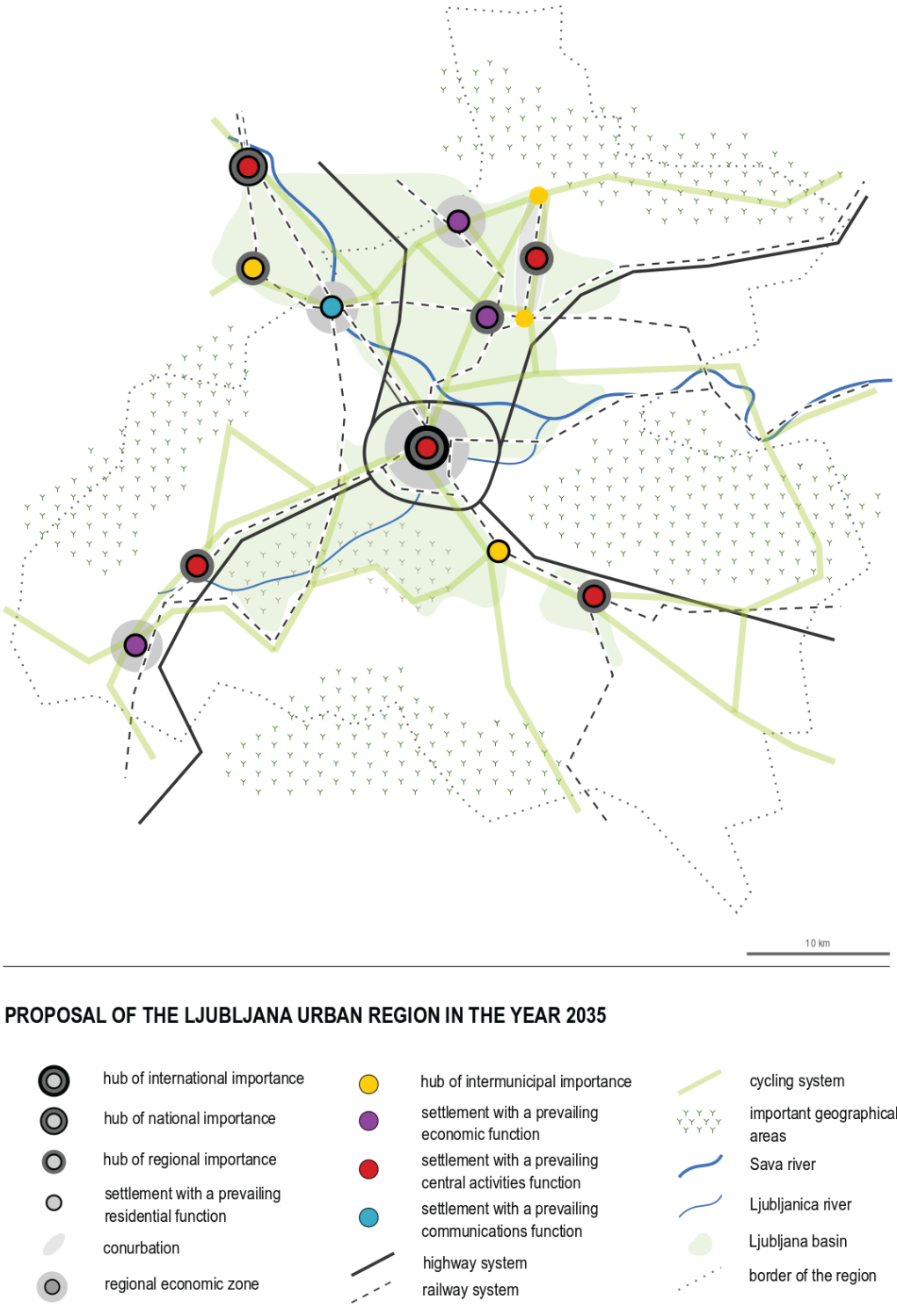


Figure 13. Group proposal of spatial development of LUR

5. CONCLUSION

The slogan LUR Connects was chosen because connecting inside and outside the region is essential for its most effective development. We believe that until 2035 the Ljubljana Urban Region, on the basis of development goals and unused potentials, can develop into a region that offers environmental, social and economic coexistence. The vision of the Ljubljana Urban Region covers the areas of living, nature, economy, and transport as a key link between the three. Taking all this into consideration, the most appropriate development of sustainable mobility will also be ensured in the region.

Source of figures:

All figures were made by team members.

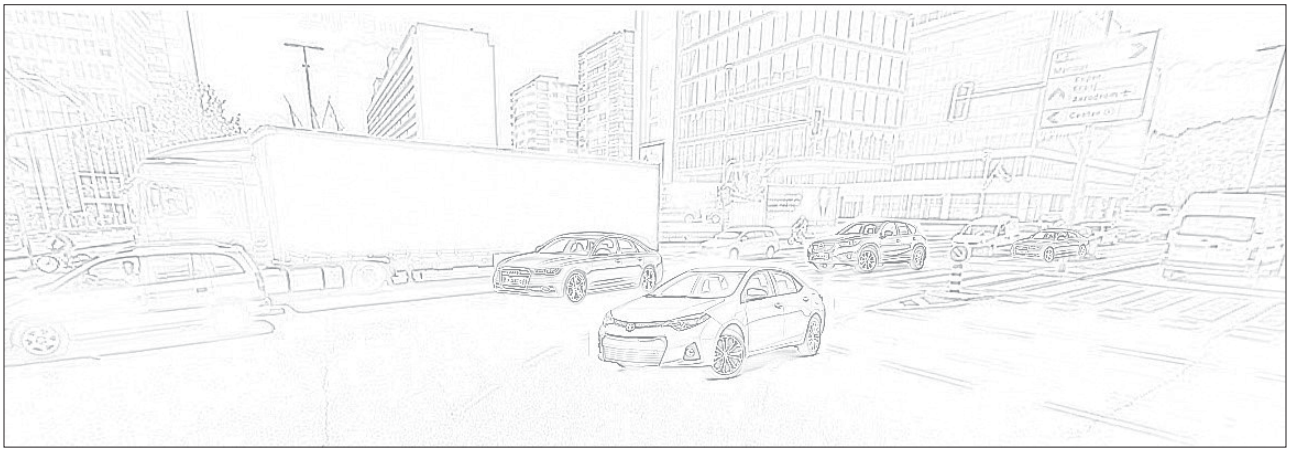


Figure 14. LUR today

Figure 15. LUR in 2035

THE LJUBLJANA URBAN REGION (LUR) VISION *"LUR TOWARDS GREEN MOBILITY"*

Matic Klun, Ines Arh, Jana Breznik, Meta Krivic, Luka Šavron

INTRODUCTION

Ljubljana Urban Region's (hereinafter: LUR) vision is its role at regional, national and international levels. The goal of the vision is to show clearly and comprehensively the expectations in the future and developmental challenges. A vision represents a tool for assessing progress. The objectives of spatial development and the main directions for achieving them are clearly and comprehensively understood. We have defined the implementation of the changes over time. Some will be achieved in the short term, while others will need more time, possibly even exceeding the target year 2035. The thematic vision focuses on the expansion and improvement of roads and on the allocation of functions.

METHODOLOGY

The vision was made on the basis of the analyzes we made in the introductory part of the project. This was the phase of analyzing the current state of the region. We analyzed important documents and plans and detected major problems in the region. We made a series of necessary measures for them. Then we draw schemes for easier understanding. In the end, we made the conclusion of regional development. Steps of the working process were:

1. Analysis of the current state
2. Analysis of major current documents and plans
3. Detection of major challenges in the region
4. Developing a set of necessary measures
5. Joint discussion, narrowing-down of measures and development of a concept
6. Drawing up schemes
7. Further discussion
8. Conclusion of a regional vision

REGIONAL ISSUES

On the basic of the analyzes and discussions carried out, we identified 8 main problems that we addressed in our vision:

1. disproportional distribution of services and employment capacities cause migrations and traffic
2. poor travel habits of the inhabitants
3. deficient long-distance public transport (inadequate frequencies, inaccessible stops, bad railway)
4. lack of long-distance bicycle connections
5. road congestion with transit freight
6. conflicts of interests in land use
7. environmental burdens (noise, floods, air pollution)
8. increasing prices of apartments and lack of housing

THE VISION OF THE LJUBLJANA URBAN REGION 2035

"LUR – TOWARDS A GREEN MOBILITY"

Vision of the Ljubljana urban region (LUR) for 2035 is supported by measures that can help to achieve worked-out goals under the slogan **"LUR – Towards a Green Mobility"**. LUR will focus its development mainly on the public transport infrastructure, increasing the percentage of green areas, focusing on the internal development of settlements through the renovation and redistribution of activities and housing. Human capital will have great importance. The population of LUR will have a higher percentage of highly educated workforce, which will be prepared for mutual generation and sectoral cooperation, thereby contributing to sustainable planning and the creation of living area and society.

The main objective of developing transport infrastructure is the transition to sustainable mobility. The location of LUR at the crossroads of two international transport corridors (5th and 10th) and the center of the capital city of Ljubljana will be the driving force in the development of sustainable forms of mobility and will serve as a model for other parts of Slovenia. City centers will continue to shut down for car traffic. It will strive to minimize the use of fossil fuels, which will no longer be used in

transport. Public passenger transport will be the driver of a traffic revolution in the region by using environmentally friendly energy (gas, electricity). New traffic routes will be introduced in accordance with a high proportion of greenery and will serve primarily for the development of non-motor and public transport. Innovative transport approaches will effectively address road traffic problems without the additional expansion of motor lanes. Loss of quality space due to transport infrastructure will be minimal. Traffic areas will give priority to cyclists with city and regional cycling routes and public passenger transport with yellow lanes. In this way, a healthy lifestyle will be promoted, while greater green areas will increase the percentage of riders and pedestrians. Bike routes will take place on local, urban, and municipal roads. Electric bicycle rental will be available in 2035. Rail transport will be modernized in the busiest railway lines and supported by high technology and modern trains. Within LUR, the railway stations will be refurbished, the renovation of intermodal points will be carried out with greatest emphasis on the development of the modern main railway and bus station Ljubljana. Automated and online purchase of all public transport tickets in the region will be provided for. The railway will be developed within the existing routes and with the new Brnik route, which will connect the international airport with Slovenia's capital city. The frequency of trains and buses will increase in all cities of LUR, thus solving traffic jams. Daily migrations will be redirected to suburban railways in 2035, which will be linked to bus and cycle traffic with integrated tickets and intermodal transfers, the possibility of using the P & R car park and the sharing of electric vehicles. Greater diversity and efficiency of the public transport network will increase the time and money efficiency of mobility. In 2035, regional e-bicycles with electric charging stations will be available in cities. The inhabitants of the region will have greater choice among travel modes, and unlimited travel will be allowed for. All information on the possibilities of crossing, the number of available bikes, and free places in covered bicycles will be available electronically via mobile devices and at all stops within LUR. All urbanized areas will be arranged for different types of users of traffic surfaces. Physical roadblocks (curbs on bicycle paths and sidewalks) will be eliminated, in the entire urban area of the region a system of sound traffic lights and ground guiding routes for the blind will be established. LUR will be a region friendly to people with reduced mobility and children, as they will be equipped with appropriate infrastructure to younger pedestrians and cyclists, all school districts are organized, and organized cycling to school will also take place. The city of Ljubljana has the vision to become a city without traffic accidents with a fatal outcome (zero vision).

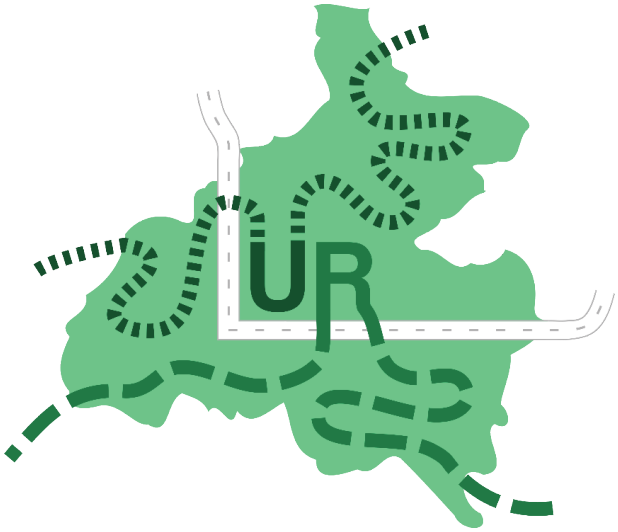
Freight traffic will take place by rail. In 2035 a new metro will be under construction for freight traffic. This will relieve the environment of noise and pollution, increase the efficiency of freight transport and relieve the roads and internal suburban rail tracks. Logistic centers will be located in existing economic areas and along the new route in the wider hinterland of Ljubljana.

The trend of physical expansion of cities will be achieved by 2035. City growth will be controlled because of political and demographic changes. The process of suburbanization will be halted by 2035. Construction in restricted areas (flood, erosion) will be prevented. Development cities around Ljubljana will stimulate the mixed use of space, thus reducing the need for migration. In 2035, the goal of shortest distance between workplace, home, day-to-day work, and leisure activities will be achieved. Rural settlements will be preserved on the current scale and with the state encouraging the preservation of agriculture and a typical agricultural landscape. New buildings will be placed within the existing limits of settlements. There will be no brownfields in 2035 within LUR. Depending on their characteristics, new activities and residential areas will be placed on them. The centers of the settlement system will be well equipped with telecommunications and municipal infrastructure. (Consolidation of building land will be provided by high quality residential areas). Due to the quality infrastructure, transport between urban and rural areas will be efficient, fast and accessible. The countryside will be powered by multifunctional self-propelled cities in the region (Ljubljana, Domžale, Kamnik, Grosuplje, Vrhnika, and Medvode), which makes it possible to shorten the travel route. These well-developed cities will provide satisfactory care and a number of competitive jobs. The distance between work and stay will be shorter. A good organization of the network of central settlements will provide equipment with central administrative and administrative activities (bank, post office, store, etc.) Most of the business activities will be withdrawn from the city to the highway and the railway. The cities will be decorated with modern architecture and high-quality accommodation in renovated buildings. Self-supply of cities will also

be based on greenhouses, which will reduce energy use. The number of non-profit social and renting dwellings will increase, which will attract mainly younger residents. For the elderly, well-connected, protected and well-maintained neighborhoods will be built, which will enable quality of life for the elderly.

The vision of the region is therefore to successfully integrate the various spheres of human engagement, the appropriate linking of these spheres with each other, and the optimization of time devoted to traffic.

STORY BEHIND THE LOGO



Our logo is in the shape of the region. Lines clearly symbolize different forms of traffic. As it is evident, road traffic is placed in the background. In the foreground, there are cleaner and sustainable forms of movement, such as rail, bicycle, and pedestrian traffic. We emphasized our principles by using the different but exclusively green shades. The motto is: "LUR – Towards a Green Mobility".

GOALS

Our goals are based on four key principles:

- we prioritize people over vehicles,
- we plan cities and their mobility together,
- we promote the transition towards a zero-emission future and renewable energy, and
- we support the shared and efficient use of vehicles, lanes, and land.

Our nine development goals cover transport, economy, land use and people. All of the goals listed below have one common goal. To reduce the need for migration and reduce migration distances and time.

Decentralization of services of general interests

State offices will have their offices located throughout the region, and not just in the city of Ljubljana. We believe that the location of services should not be based solely on economic principles, but also on the provision of services across the wider region. This will reduce developmental disparities.

Dispersion of companies

Companies in the region will be located in all cities and not just in Ljubljana. Thus, all cities in the region will develop more evenly. Ljubljana will not be the only employment center.

Encouraged mixed land use and short commuting distances

With mixed land use, daily tasks will be closer to the people, and the time spent will be shorter.

Establishment of a railway connection between Ljubljana Airport and Ljubljana

A railway will connect Ljubljana and the airport. This is of strategic importance for developing the capital city.

Freight railway and road transport is moved outside the city of Ljubljana

Freight road and rail transport will be diverted outside the city center of Ljubljana.

Efficient frequency of public transport

Improved frequency of public transport at all levels – city and regional – will improve the quality of the services and activities offered. A larger number of people will opt for this form of transportation.

Establishment of the regional network of covered bicycle shelters at strategic points

Covered and secured bicycle garages will be located in cities around the region. They will be located at optimal distances, which means that after leaving the bike people will walk only a few hundred meters on average.

Rural inclusion in the urban system

Each city in the region will have the task of supplying its rural hinterland. This will reduce migration towards Ljubljana.

Affordable and accessible housing

Adequate housing policy will ensure easier access to housing for all people. The importance and the number of social housing will increase.

ACTIONS

We are striving to accomplish our goals and to fulfil the vision for 2035. Therefore, we thought about actions that have the main focus in changing today's mobility patterns. Due to our issues, we were looking for some good examples of solving the same issue in other regions (all around the world) and we also thought about LUR's special features, to see if the implementation of some actions could (and would) solve the issue. We focused mainly on five pillars: **settling, cycling and walking, public transport, private transport, and strategic actions**. All these pillars were filled with different actions. In this article we will present only two actions from every pillar, just to see how we were thinking about solutions. All other actions are shown in Table 1. We made a plan with a timeline so that every action shows when an action should be excluded and when it should be completed. We planned short-term actions (will be implemented in the next 5 years), mid-term actions (in the next 10 years) and long-term actions (in the next 15 years). We were considered the potential stakeholders.

Settling

- Regional Spatial Plan

Regional Spatial Plans are plans that will be steering the development in the region. Plans should be made in all Slovenian regions by 2023. LUR's Regional Spatial Plan will be a base for developing the region for all its sectors (economy, society, transport, environment, etc.). This document's aim is to provide a sustainable connected system. We plan that due to settlement development (especially in the hinterland of Ljubljana) that will be incorporated in Regional development plan, mobility will be shortened as well.

- Protected neighbourhoods for the elderly

Our population analysis shows that aging will be a serious problem in the future. Due to the increasing share of the elderly, we will need well-designed neighborhoods and homes for the elderly. As we know, elder people are having problems with mobility so we strive to connect and plan new homes for them, together with a plan for their mobility. Therefore, we will connect a growing population of the elderly (that are often unable to use personal transport, but are still able to use public transport) with the rest of the region.

Cycling and walking

- Development of urban and regional cycling routes with associated cycling infrastructure

Cycling has had a growing popularity within cities and towns in the region. As we can see, the bicycle is a totally comparable mode of transport across short distances. We would like to improve not only urban cycling routes but also cycling between towns. For distances up to 10 km, cycling could also be a good possibility for commuting. The town centers in LUR are within this distance. For example, city centers of Domžale and Kamnik, Trzin and Domžale, Trzin and Ljubljana, Brezovica and Ljubljana, Logatec and Vrhnika and many others are within this distance. So, rather than only a recreational value, regional cycling routes could be a really good alternative for commuting. Cycling roads will be also connected with multimodal stops, where people could leave their bikes under roofed bicycle shelters and then take the bus or the train. Many of these stops will be also connected with P+R systems.

- Arrangements for vulnerable social groups

There are many vulnerable social groups, e.g. people with disabilities, children, elderly, etc. We would like to improve today's adjustments for these groups (that are highly localized in some towns, and are totally missing in others) and we would like to recognize places all around the region that need to be arranged for all vulnerable social groups. For example, people with disabilities have many problems with moving. It does not matter which mode of transport they are using, we would like to assure a regional scheme, that could help people with disabilities help to move around all urban places in a region without bumping into physical obstacles or to set up have good guiding paths (for blind people), etc. We think that if a regional scheme will address this issue appropriately, municipalities will also follow.

Public transport

- New railways

In our vision. new railway systems should be the biggest investment of all resources. We are planning to make two new railways. One will be a connection between Ljubljana, Ljubljana Airport and Kranj. This one will provide the most optimal connection with the Airport.

Another investment will be an underground railway system for freight. This railway system will relieve the center of Ljubljana with cargo trains, which could help to introduce a good public train line inside of Ljubljana.

- Ticket integration and automation of ticket purchases

This action is a really logical and simple upgrade of today's public transport system. Today public transport inside towns and regional public transport are separated. We want to integrate all public transport, so one card would be enough to use any transport system in the region. We would make a connected online purchase system, so you would not need to buy a new ticket when switching lines or modes of transport. Around all the public transport stops we will provide automatic ticket vending machines. This system can be integrated very soon. And it is expected that it will be introduced in the next 3 years.

Private transport

- Restrictions for cars with EURO 1–3 standards and benefits for environment-friendly cars

Today city centers are being closed for motorized traffic, but we are going one step further – our actions also benefit towns and centers. Entrance to towns would be restricted for private and cargo transport with EURO 1–3 standards. This means that releases from engines will be much smaller in urban areas. On the other hand, vehicles that are running on environmentally more friendly energy will have some benefits, e.g. free parking.

- Parking policy – car parks outside centres

We will support further closing of town centers in all LUR's settlements that have more than 2,000 inhabitants. Our idea is that the main center area (wherever possible) will be open for pedestrians, cyclists and other slow and (mostly) nonmotorized vehicles.

Strategic actions

- Promotion of sustainable mobility

Nowadays cars are considered by many as the most convenient way of transport. Many people don't even think about other possibilities or they think taking public transport is only for people, who cannot afford a car. As traffic planners, we have to think also about people's routines and value judgments. If we want to change routines and make public transport and the use of other transport more appealing, we have to start not only by making better infrastructure but also by educating and promoting. Therefore, we will organize different events, we will provide a free trial of new systems, etc.

- Strengthening of cooperation between municipalities in the region

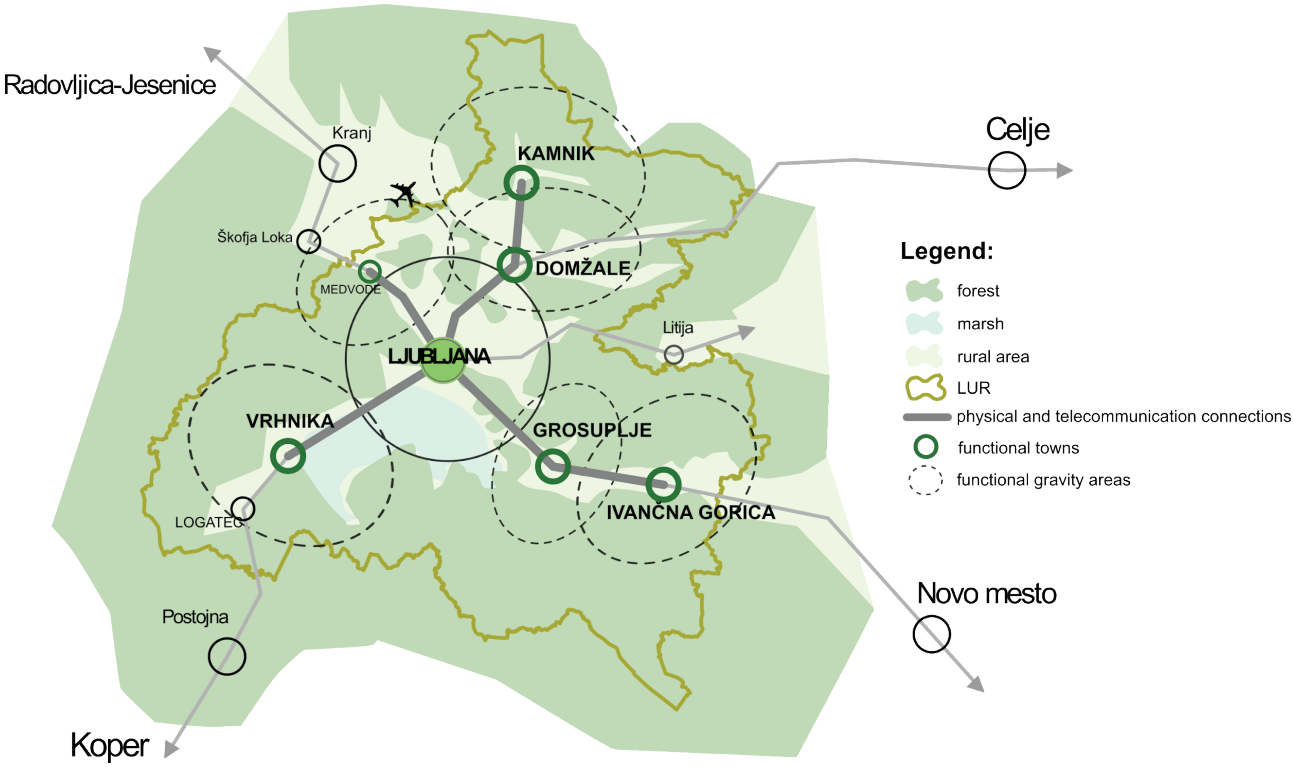
Municipalities in the same region have to work together to achieve a higher goal. People in the region are often commuting from one municipality to another and therefore they are somehow part of all those municipalities. If municipalities work well together they can ensure that their infrastructure is available also for other people and that infrastructure and plans are consistent with the municipalities in the same region and bordering municipalities.

SCHEMES

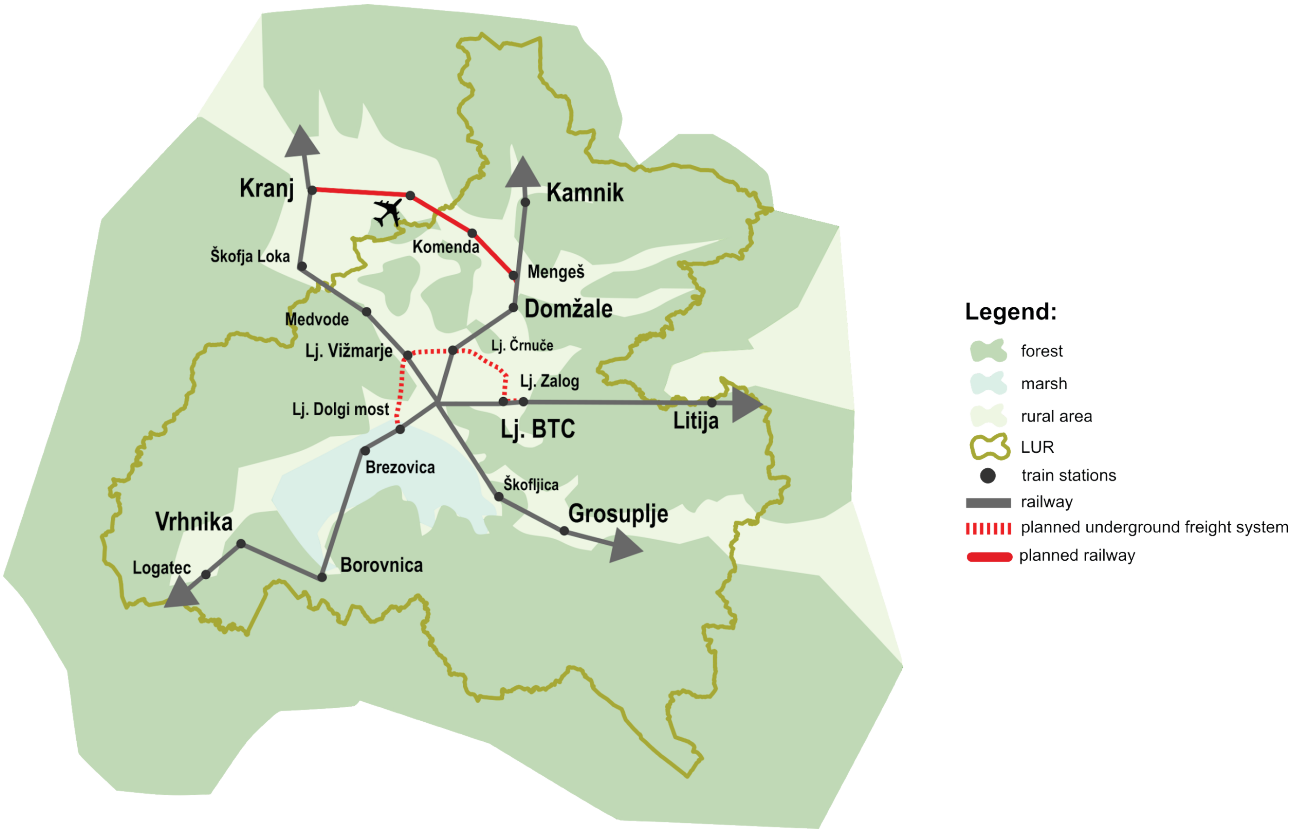
Our goal is to make a polycentric region, comparable to Howard's garden city. This could be achieved by strengthening the towns around Ljubljana. Towns Vrhnika, Medvode, Kamnik and Domžale, Grosuplje and Ivančna Gorica already have a suitable location for such development. We would invest in good physical and telecommunication connections between towns and Ljubljana. Each town inside LUR will have a bigger gravity area with new functions that would take off the pressure on the capital. Decentralization of services of general interests and dispersion of companies would make towns more interesting for work, which is how our goal of short commuting distances could be met.

For Ljubljana to stay a powerful, green capital of Slovenia and an important city for Europe, some traffic alterations are planned. Our main goal was to focus on sustainable transport with the development of the railway and cycling network. We plan to build a railway connection from the new modern main train station in the city Ljubljana to Ljubljana Jože Pučnik Airport via Domžale. From the airport to Kranj, the railway will make a full circle which will attract inhabitants to use rail transport more frequently. The railway will be used for passengers and freight.

Road congestions with transit freight will be reduced on account of freight railway moved outside the city and underground. Therefore, existing railways will be unloaded and free to use for an efficient network of the suburban railway. The suburban railway will connect strategic points such as P+R with the new main train station. Road traffic will decrease, and

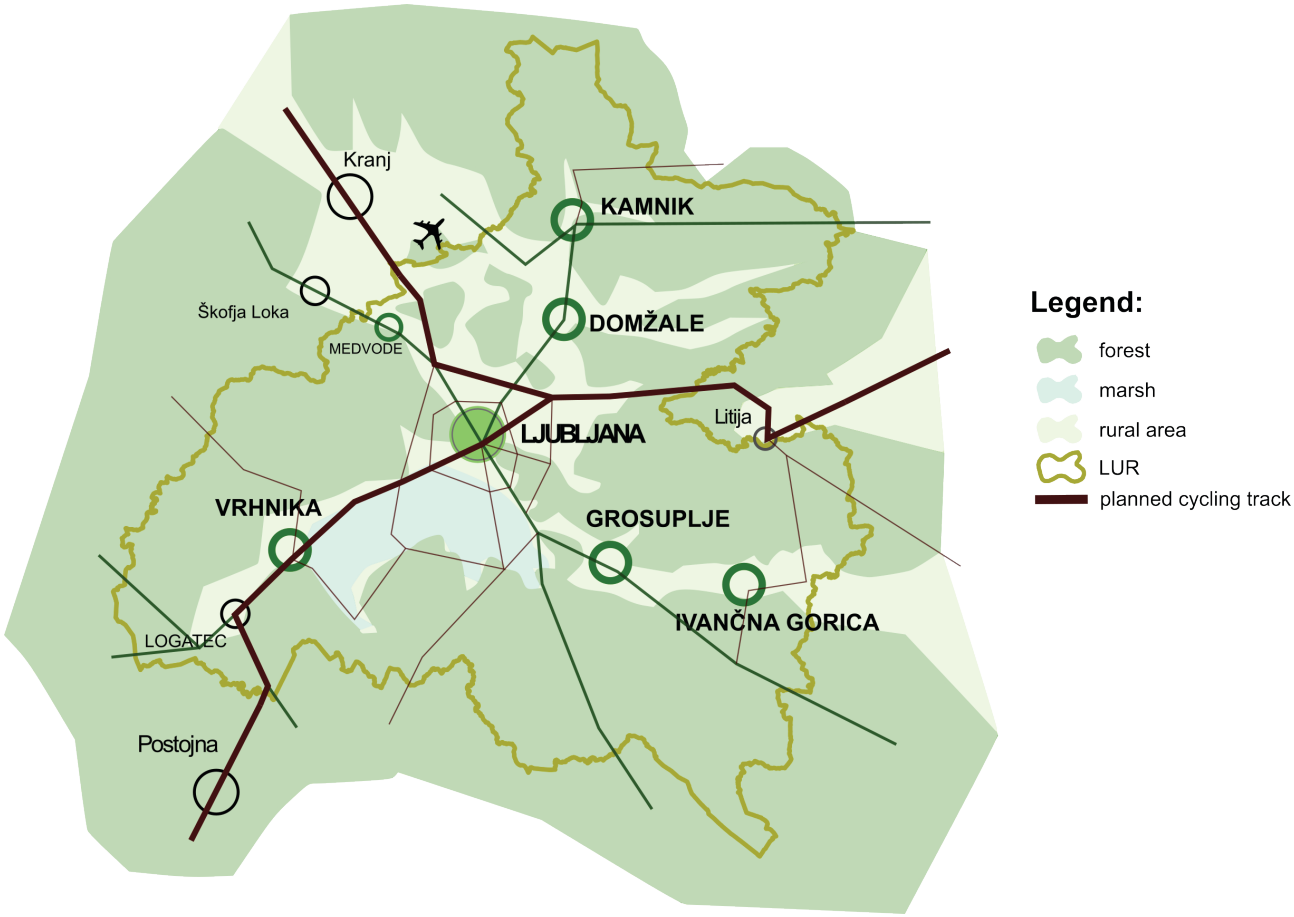


Scheme 1: Gravity areas and connectivity of the settlements



Scheme 2: Railway network system

roads will become more friendly for cycling and walking. With new technologies such as e-bike, strong long-distance bicycle connections are needed. We planned them as a main cycling network that goes, as European corridors, through Ljubljana. Other cycling networks are planned on a regional and local level.



Scheme 3: Cycling tracks

STAKEHOLDERS

As the region does not have its own administrative authority that would take care of financing of the various actions, we had to think wider. Some actions have a national or even global impact (e.g. new railway lines), others have a regional impact, etc. Actions can be put in place by different institutions, while interests in investments can be quite high. Therefore, it is important to consider the stakeholders, not only the institutions and people who will finance actions but also those who will be affected by the new actions. Here, we need to focus on various stakeholders:

- Municipalities in the region
- Regional development agency RRA LUR
- Various ministries (representing state investments)
- Directorate within ministries – DRSI, etc.
- Some private investors (external)
- Landowners
- People affected by actions
- Public transport companies
- EU
- …

An optimal number of stakeholders should be involved, which are very specific and can change from action to action. In Table 1 we considered the stakeholders involved in the implementation of the actions.

CONCLUSION

The Ljubljana Urban Region is the most developed region in Slovenia. Of course, Ljubljana, the capital of Slovenia, contributes greatly. Future development of the region will rely more heavily on other smaller towns such as Kamnik, Domžale, Grosuplje, and Vrhnika. These cities will develop, while at the same time Ljubljana will be relieved of today's (traffic) pressures. Nevertheless, it will maintain its power and importance, but development will pick pace in other parts of the region.

With the development of other cities, daily migrations will be shorter and faster. Well-developed cities will then power their functional areas. These cities will have a greater employment and administrative role than they have today.

Table 1: Time range of the actions and stakeholders

ACTIONS	SHORT-TERM ACTIONS	MEDIUM-TERM ACTIONS	LONG-TERM ACTIONS	
	2021 - 2025	2025 - 2029	2030 - 2034	STAKEHOLDERS
Settling				
Making a regional spatial plan - as a basis for the redistribution of activities				MINISTRIES, MUNICIPALITIES, RRA
Building protected neighbourhoods for the elderly		one neighbourhood per year		MUNICIPALITIES, EXTERNAL INVESTORS, MINISTRIES, EU
Financial incentives for placing activities: a) in degraded areas b) in economically weaker towns	half of the funds over the 1st five-year period	half of the funds over the 2nd five-year period		MINISTRIES, MUNICIPALITIES, MGRT
Offering new non-profit apartments: a) the purchase of unassigned dwellings and the conversion into non-profit housing b) construction of new non-profit apartments		30 apartments per year		MINISTRIES, MUNICIPALITIES, HOUSING FUND, EU
Appropriate adjustment of municipal plans to regional plans				MUNICIPALITIES
Good equipment with public utilities				MUNICIPALITIES, EXTERNAL INVESTORS
Decentralization of public and other services				MINISTRIES AND OTHER PUBLIC SERVICES
Cycling and walking				
Development of urban and regional cycling routes				MINISTRIES, MUNICIPALITIES, REGIONAL AGENCIES, EU
Removing physical obstacles to cycling and pedestrian areas in all urban areas				MINISTRIES, MUNICIPALITIES, EU
Arranging guides for the blind in all urban areas				MINISTRIES MUNICIPALITIES, EU
Traffic organization of school districts a) footpaths b) cycling routes				MINISTRIES, MUNICIPALITIES, EU
Public transport				
Ticket integration and automation of ticket purchases for public transport (installation of automatic ticket vending machines and online platforms)				PUBLIC TRANSPORT COMPANIES, MINISTRIES
Purchase and conversion of all public transport vehicles to energy-friendly sources				PUBLIC TRANSPORT COMPANIES, MINISTRIES
Optimizing public transport by setting up an alternative network				PUBLIC TRANSPORT COMPANIES, MINISTRIES
Modernization of existing railway tracks				PUBLIC TRANSPORT COMPANIES, MINISTRIES
Construction of a freight underground railway				PUBLIC TRANSPORT COMPANIES, MINISTRIES

ACTIONS		SHORT-TERM ACTIONS	MEDIUM-TERM ACTIONS	LONG-TERM ACTIONS	
		2021 - 2025	2025 - 2029	2030 - 2034	STAKEHOLDERS
Construction of logistics centers					PUBLIC TRANSPORT COMPANIES, MINISTRIES, EXTERNAL INVESTORS
Construction of railway Domžale–Mengeš–Komenda–Airport–Kranj					SLOVENIAN RAILWAY NETWORK COMPANY, MINISTRIES
Renovation of railway stations			3 railway stations per year		SLOVENIAN RAILWAY NETWORK COMPANY, MINISTRIES, MUNICIPALITIES
Construction of a multi-modal stop - bus and train station Ljubljana					SLOVENIAN RAILWAY NETWORK COMPANY, MUNICIPALITY OF LJUBLJANA, EXTERNAL INVESTOR
Establishment of 19 new and arrangement of existing multi-modal centers with the following equipment: a) covered bicycle shelters b) a system for sharing of electric and ordinary bicycle (ordinary in towns, electric also in the suburbs) c) a system for electric car sharing d) bus stop e) P + R system f) railway station (if a multi-modal center is planned along the railway line)		P + R, bicycling and bicyles are established in all places	Electric bikes and the sharing of electric cars are established at all locations		PUBLIC TRANSPORT COMPANIES, MUNICIPALITIES
Creating a joint application and a web-based integrated passenger transport system in the region					
Private transport					
Limitation of vehicles with the EURO 1-3 standard in all city centers - introduction of the "green regional card" and benefits for environment-friendly cars					MUNICIPALITIES
Continuing the implementation of parking policy - car parks outside the centers of settlements					MUNICIPALITIES
Strategic actions					
Promotion of sustainable mobility		All the time (few times a year)			MUNICIPALITIES, REGIONAL AGENCY, MINISTRIES
Strengthening cooperation between municipalities in the region		All the time			MUNICIPALITIES, REGIONAL AGENCY
Strengthening cooperation between LUR and neighbouring regions		All the time			REGIONAL AGENCY

Due to the development and progress of public transport it will prevail over cars. Frequencies and connectivity between places will be improved. Within the cities, there will be networks of bicycle garages, which will further contribute to healthy mobility.

Important changes related to Ljubljana include the railway to the airport and re-routing of freight traffic outside the city centre.

BELGRADE URBAN REGION

Students of Master studies of Spatial Planning
- school year 2018/2019 -

and

Vladimir Popović

POSITION AND ADMINISTRATIVE DIVISION

GEOGRAPHICAL POSITION OF THE CITY OF BELGRADE

The region of Belgrade is located at the confluence of two large rivers, the Danube and the Sava, in the contact zone of the southern perimeter of the Pannonian Basin and the northern edge of the Balkan Peninsula. Belgrade has a complex morphological structure, both the basic – natural one, and the modern one, created by complex transformations and the development of the inherited city grounds. Belgrade's altitude above the sea level ranges from 71 m (the lowest point: Grocka) to 628 m (the highest point: Kosmaj). The main directions of the city development are Podunavlje region (Batajnica - Zemun - Novi Beograd - Grocka) and the region of the rivers Sava and Kolubara (Belgrade - Železnik and Novi Beograd - Surčin), which match the arterial highways: highway towards Niš (Corridor 10) and Ibarska highway. Related to these routes, other important roads are spreading radially.

Coordinated and improved European road network represents the backbone of the development of today's Europe. In this context, the special role is the one of Trans-European (TEN-T) and Pan-European transport network, where the interest of the EU is obvious regarding the building of the road network of Serbia with the surroundings. It primarily refers to the international navigation route E-80 and Corridor 10, which intersect precisely near Belgrade (Regional Spatial Plan for the City of Belgrade, 2011).

ADMINISTRATIVE DIVISION OF THE REPUBLIC OF SERBIA AND THE CITY OF BELGRADE

According to NUTS classification, the territory of the Republic of Serbia is defined in the following way:

Figure 1: The position of Belgrade in the network of European corridors
Source: Regional Spatial Plan for the City of Belgrade, 2011

- 2 territorial units of NUTS 1 level: Serbia-north and Serbia-south;
- 5 territorial units of NUTS 2 level (regions), which are divided in the following way: Serbia-north: Belgrade and Vojvodina; Serbia-south: Šumadija and Western Serbia, Southern and Eastern Serbia, Kosovo and Metohija;
- 29 territorial units of NUTS 3 level (districts);
- LAU - local self-governments (cities and municipalities)

The territory of the City of Belgrade covers the area of 3,223 km^2 (the inner city area of 35,996 ha) and it is administratively divided into 17 city municipalities (Čukarica, Voždovac, Vračar, Novi Beograd, Palilula, Rakovica, Savski Venac, Stari Grad, Zemun, Zvezdara, Barajevo, Grocka, Lazarevac, Obrenovac, Mladenovac, Sopot, and Surčin).

The largest municipality of Belgrade is Palilula (44,661 ha), and the smallest one is Vračar (292 ha).

The administrative region of the City of Belgrade in today's borders is divided into three territorial levels:

1. continuous urban territory of the City (6 municipalities: Stari Grad, Vračar, Zvezdara, Savski Venac, Rakovica, and Novi Beograd)
2. central urban territory of the City with the suburban rural-urban zone with several separate settlements (Voždovac, Čukarica, Palilula, Zemun)
3. suburban zone of the City (Surčin, Grocka, Mladenovac, Sopot, Barajevo, Lazarevac, and Obrenovac) with town centers of the city municipalities of the same name and the corresponding settlements of mainly rural character.

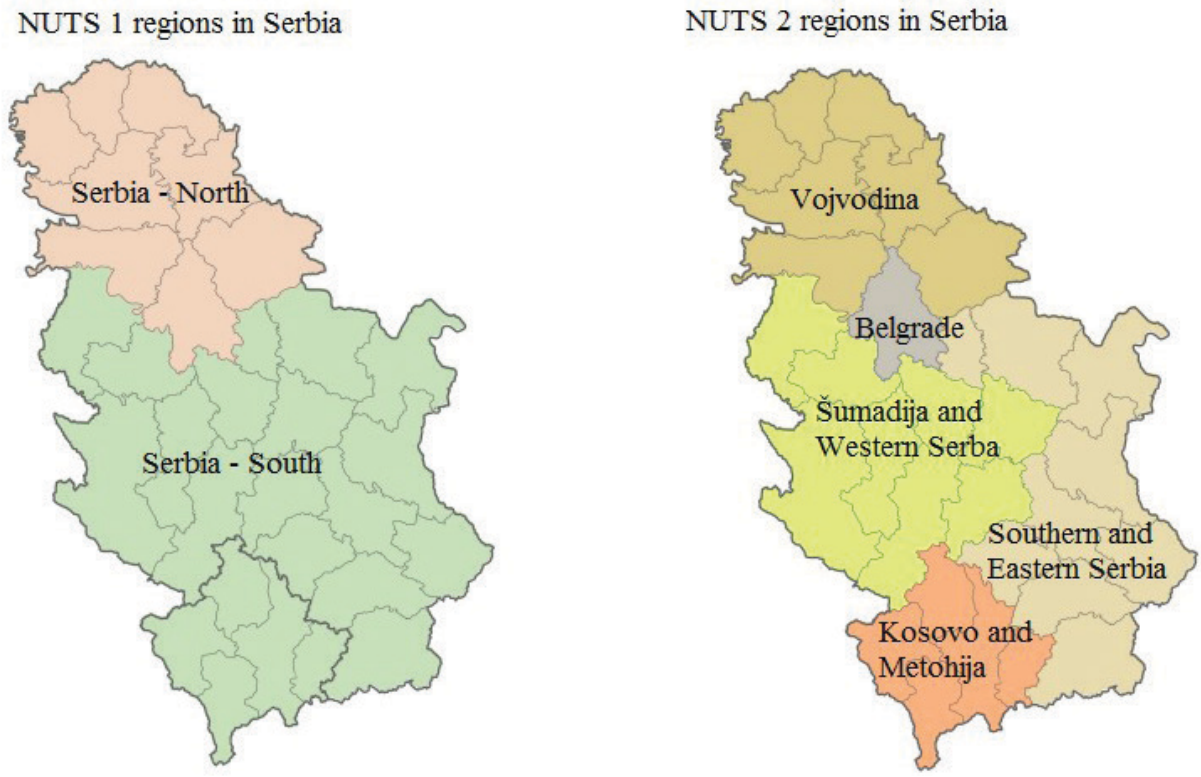
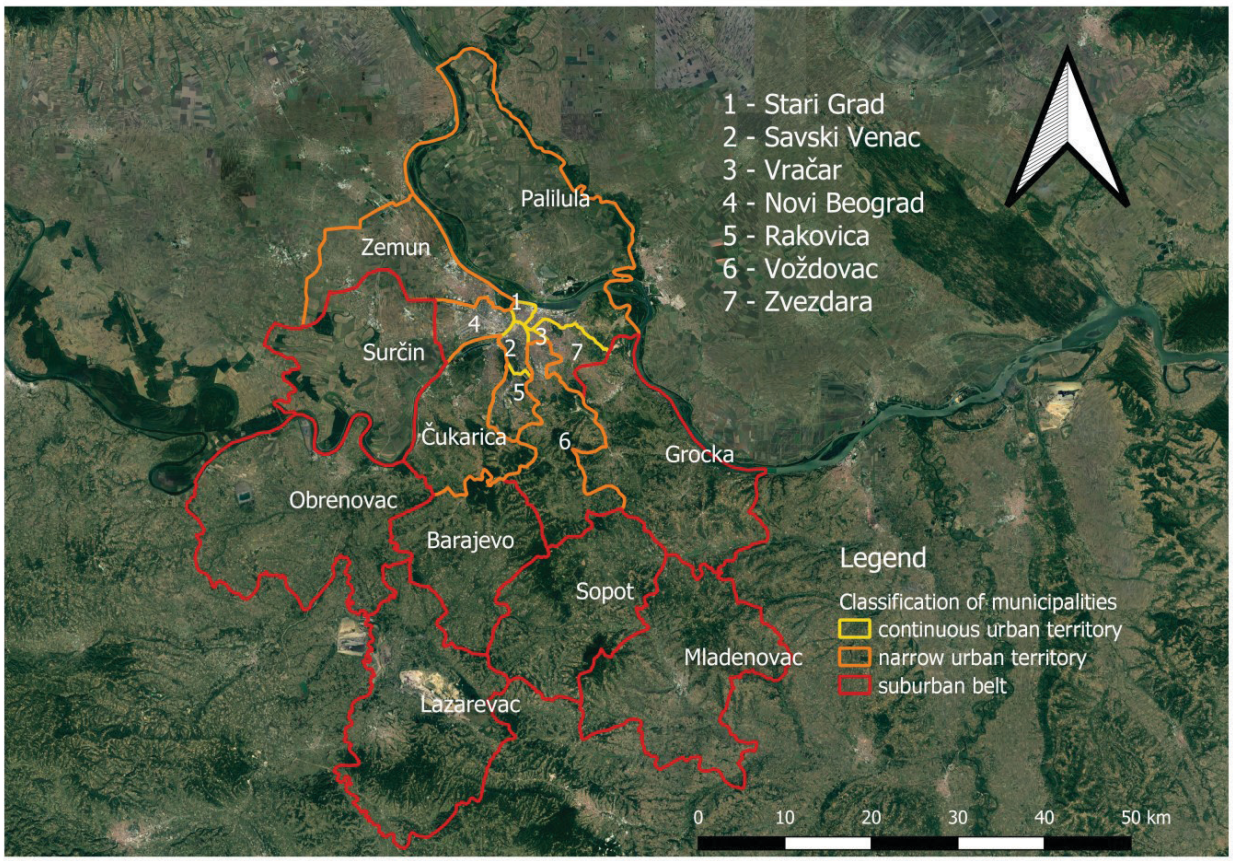


Figure 2: NUTS 1 and NUTS 2 regions of the Republic of Serbia
Source: Authors' independent data processing



Map 1: Territorial levels within the City of Belgrade
Source: Authors' independent data processing

SYSTEM OF SETTLEMENTS

Belgrade is organised into 17 city municipalities, and its largest urban settlement (statistical division) is certainly the settlement of Belgrade (cover area of 35,996 ha with 1,166,763 inhab.). Other large morphologically integral urban settlements are: Lazarevac (26,006 inhab.), Obrenovac (25,429 inhab.), Mladenovac (23,609 inhab.), which are also the centers of the city municipalities of the same name, as well as Borča (46,086 inhab.), Kaluđerica (26,904 inhab.), and Sremčica (21,001 inhab.), which developed simultaneously with the centers of the city municipalities they belong to (Palilula, Grocka, and Čukarica). Taking into consideration their proximity and the trend in the growth of the number of inhabitants, the settlements of Borča and Kaluđerica show strong tendencies toward morphological uniting with the settlement of Belgrade. Besides the mentioned urban centers, the population of the region of Belgrade is distributed in about 150 other mixed-type and rural settlements. The system of Belgrade settlements is very heterogeneous. From the aspect of development capacities, this is the most dominant region in Serbia, where the settlement of Belgrade creates its core, with which its surroundings, consisting of smaller urban settlements and rural settlements of lower or higher level of independence, transform both economically and morphologically (Development strategy of the City of Belgrade 2021, 2017)

The City of Belgrade also has a significant functional impact on its wider surroundings, through the development of economic, cultural, social, and technical connections, not only with

the municipalities and towns within its region, but also beyond its borders. Its economic territory is based on connecting the production and scientific sectors, wholesales, creative entrepreneurship, and its political territory is based on the system of discussing and making decisions together with the municipalities and towns in the functional surroundings. Today, the functional-economic territory of Belgrade consists of administrative regions of the City of Belgrade and the neighboring towns and municipalities – Pančevo, Smederevo, Smederevska Palanka, Aranđelovac, Ub, Lajkovac, Vladimirci, Pećinci, Ruma, and Stara Pazova. The widest area of the influence of Belgrade region reaches the territories of Loznica, Šabac, Valjevo, Sremska Mitrovica, Vršac, and Požarevac, and thus forms a connected region regarding traffic, energetics, culture, etc., which covers 8.6% of the territory of Serbia, defined as a functional macro-region according to the Regional spatial plan of the administrative region of the City of Belgrade (Development strategy of the City of Belgrade 2021, 2017).

Table 1: The area of the territory of the City of Belgrade and the settlement of Belgrade (by municipalities)

AREA (in hectares)	The City of Belgrade	The settlement of Belgrade
TOTAL	**322,268**	**35,996**
Islands	-	*541*
Parts of the Sava and the Danube	-	*2,225*
Barajevo	21,312	-
Voždovac	14,864	3,242
Vračar	292	292
Grocka	28,923	-
Zvezdara	3,165	3,165
Zemun	43,872	9,992
Lazarevac	38,351	-
Mladenovac	33,900	-
Novi Beograd	4,074	4,074
Obrenovac	40,995	-
Palilula	44,661	4,536
Rakovica	3,036	3,036
Savski Venac	1,400	1,400
Sopot	27,075	-
Stari Grad	698	698
Čukarica	15,650	5,560

Source: http://www.beograd.rs/

SPATIAL-FUNCTIONAL CHANGES IN THE SETTLEMENT NETWORK OF THE CITY OF BELGRADE

The territory of Belgrade region is partly located in Vojvodina and partly (the larger part) in Central Serbia. Thus, the network of settlements has been formed in accordance with the above mentioned characteristics.

In the period of 20 years (from 1991 to 2011), the number of inhabitants increased, especially in parts of Srem and Banat (the municipalities of Zemun and Palilula). The reason for this is the settling of people in these regions in the 1990s from the parts of the former SFRY affected by the war. This led to the suburbanisation in periurban part of the City of Belgrade, and at the same time, to the illegal building which comprised almost all the settlements in the border zone. This phenomenon is especially evident in the settlements toward Zrenjanin (Krnjača, Borča, and partly in Padinska Skela), and in Srem (the municipality of Zemun, on the territory between the settlements of Ugrinovci and Batajnica), as well as in the settlements in Šumadija, where illegal building also appeared, including the enormous building of weekend facilities (Regional Spatial Plan for the City of Belgrade, 2011)

There are five groups of settlements according to the urbanity level, depending on certain criteria (Tošić, 2012): ***Urban, More urbanised, Less urbanised, At th urbanity treshold*** and ***Rural*** (Table 2).

The analysis from 1971 gave a clear differentiation of the settlement of Belgrade itself compared to the rest of the territory. Also, there was a zone with a lower level of settlement urbanity, which is the characteristic of the municipalities in the suburban zone. There was a large number of rural settlements, with enclaves of lower or higher level of urbanity.

In 1971 the majority of settlements belonged to the agrarian type (92), which means that the majority of population was working in the primary sector of industry. In 2011, the situation was completely changed – numerous agrarian settlements disappeared completely (one settlement remained, for which it can be assumed that has transformed until today). The largest number of settlements is dominantly of the service-providing type. The whole settlement of Belgrade had the impact on the surrounding area, since the settlement itself is of service-providing character, which is one of the reasons for the transformation of the area. In the same year, in 2011, the settlements characterised by industrial and industrial-service-providing activities became notable, especially the industry of Lazarevac, which influences the surrounding area, so the south of the administrative region of Belgrade was based on the secondary sector.

Table 2: The model for determining the level of settlement urbanity

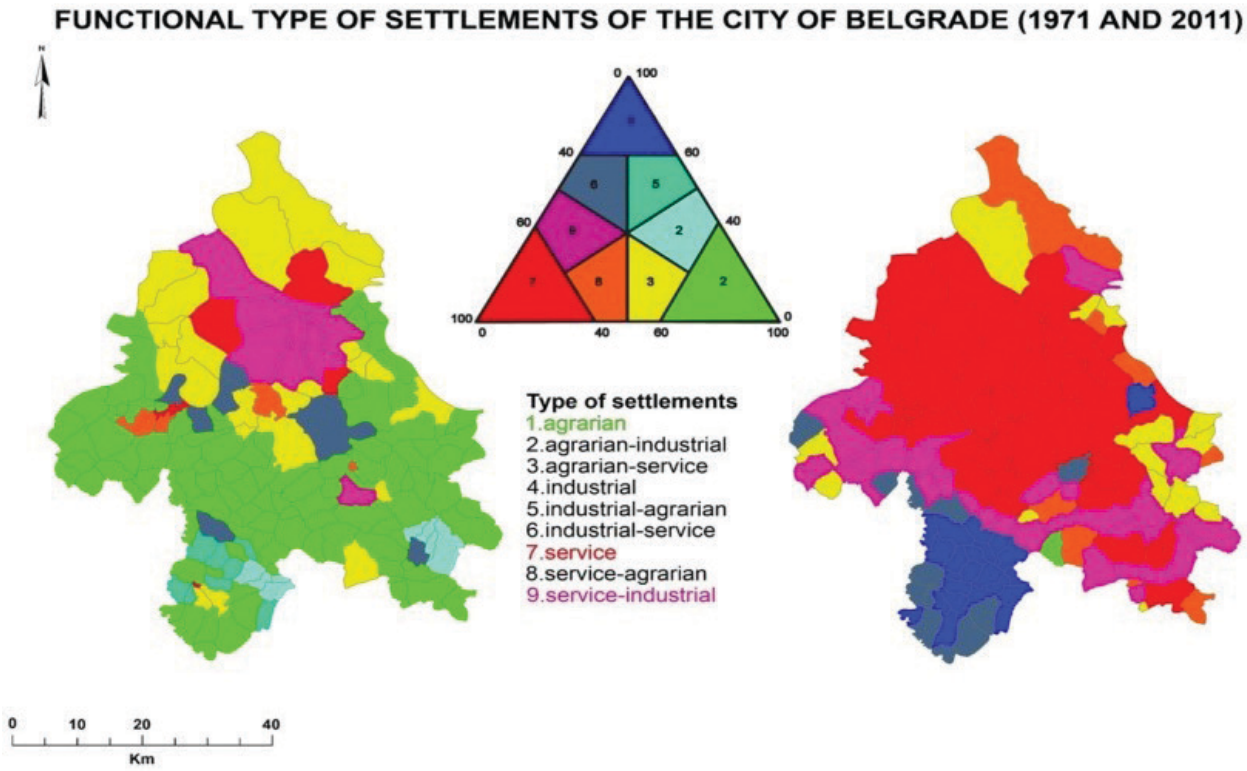
Level of urbanity	Active agricultural population in the total number of active population	Households without an agricultural holding in the total number of households (%)	Employed (workers) in the total number of active population
Urban	≤10%	≥70%	≥70%
More urbanised	≤15%	≥20%	≥70%
Less urbanised	≤30%	≥10%	≥50%
At the urbanity threshold	Meet two out of three criteria		
Rural	Do not meet two or all the three criteria		

Source: Tošić, 2012

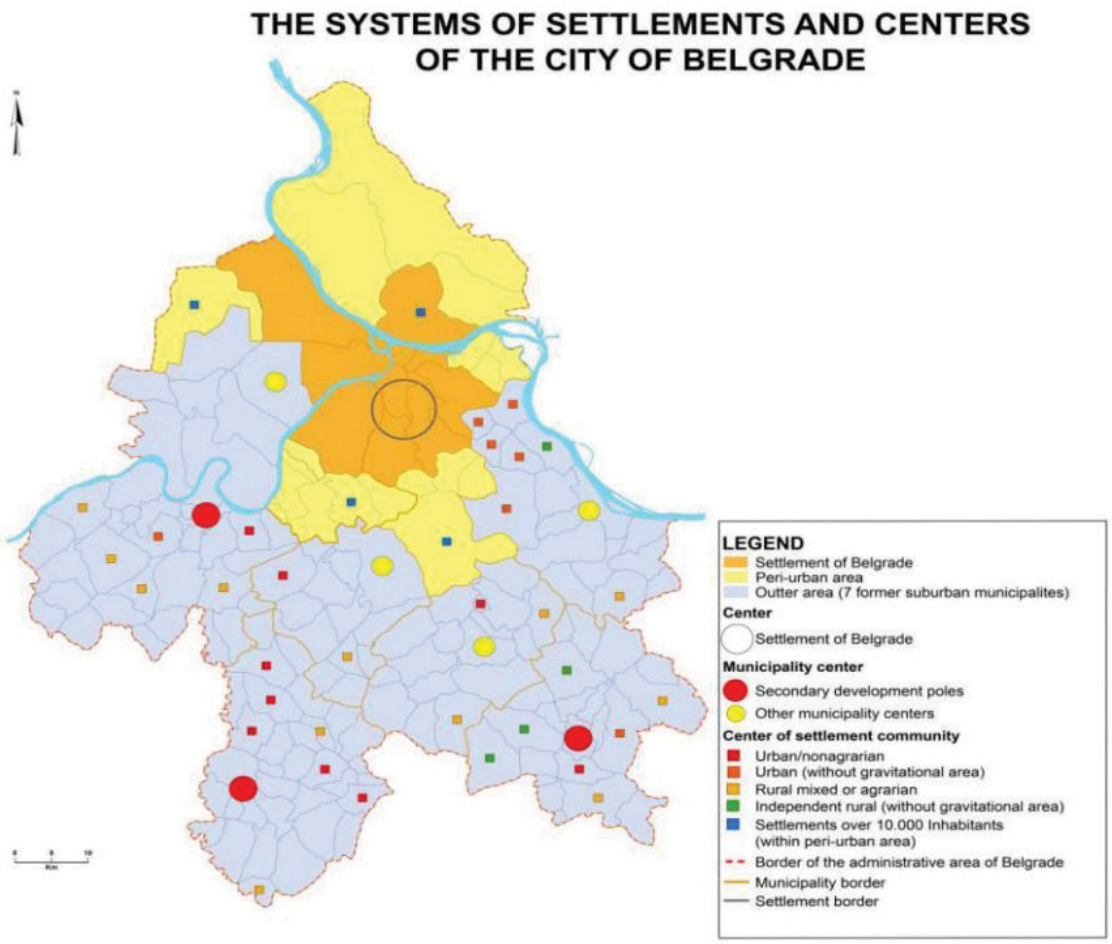
There was also a zone of industrial and service-providing settlements which, as supposed, transformed under the influence of the industrial settlements form the south, and the service-providing ones, influenced by the north (Map 2).

Based on the ability of settlements to satisfy the needs of their population, as well as on other characteristics (primarily taking into consideration the elements of their geographical position), the significance and the appropriate position in the functional hierarchy is defined. The settlement communities comprise the center of the settlement community and the settlements which are functionally turned toward it. The centers of settlement communities are larger settlements in terms of the number of inhabitants, and their location is such that it provides them the functional connection with numerous settlements of the lower hierarchal level (Tošić, 2011).

Besides, the higher level in the hierarchy is a direct result of their ability to use outer functions. The settlements with no gravitational region can be defined as settlements which could be the centres of settlement communities by their characteristics, but, in their surroundings, there are no settlements which gravitate toward them in the functional sense. On the territory of 7 municipalities of the suburban zone of the City of Belgrade there 27 settlement communities in total (Map 5), which comprise 5 settlements on average each (with the total number of 137 settlements). Most of the settlements are within the settlement community of the municipality of Lazarevac (34), whereas the smallest number of settlements within the settlement community is in the municipality of Barajevo (13), with the exclusion of the municipality of Surčin, within which there are no centers of settlement communities.



Map 2: Functional typology of the settlements of the City of Belgrade, for 1971 (left) and 2011 (right)
Source: Authors' independent data overview



Map 3: The system of settlements and centers of the City of Belgrade
Source: Authors' independent data overview

At the top of the hierarchy is the settlement of Belgrade, with almost 1,200,000 inhabitants. The next ones are the secondary centers of Mladenovac, Obrenovac, and Lazarevac, with about 25,000 inhabitants each, which represents a significant difference in terms of the number of inhabitants between the first two levels in the settlement hierarchy. The next level in the hierarchy comprises the municipal centers of Barajevo, Sopot, Grocka, and Surčin, with a large range in the number of inhabitants – from almost 20,000 in Sopot to over 18,000 in Surčin. Then follow the ***Centers of the settlement communities*** (hereinafter: CSC), and ***Primary rural settlements*** (Regional spatial plan for the City of Belgrade, 2011).

The seven suburban areas of the AR Belgrade are divided into two groups. The first group comprises Lazarevac, Obrenovac, and Mladenovac, whose municipal centers have the roles of suburban centers, i.e. of the secondary poles of the development of the metropolitan suburb, and the second consists of Barajevo, Sopot, Grocka, and Surčin, with underdeveloped urban functions of the local self-governments of the same name (Regional Spatial Plan for the City of Belgrade, 2011).

These municipalities, which had the status of being outside the city before, are now city municipalities of the suburban zone, and they have the same characteristics as other municipalities in Central Serbia. However, their disadvantage is that they are within the AR Belgrade, in the centralized system of government, so they have fewer authorities in comparison with other municipalities in Serbia.

Obrenovac (over 25,000 inhab.) is an administrative and industrial-residential sub-center of the Belgrade agglomeration. The economic basis of its development comprises the energetic and industrial complex on one side, and intensive agriculture of the rural surroundings on the other. It is the administrative center of the municipality which consists of 29 other settlements, with more than 72,000 inhabitants. The majority of settlements belong to the group of industrial-agrarian settlements. Obrenovac is the primary center of work of the population of its municipality and the secondary center of work of the whole metropolitan. It is one of the main business

centers of Serbia, primarily due to the two industrial giants for the production of electrical energy, TPP Nikola Tesla 1 and 2, which supply Serbia with more than 60% of electrical energy.

Lazarevac (over 26,000 inhab.) is the center of the municipality of the same name which has 34 settlements with around 60,000 inhabitants. Besides Lazarevac, there are another two urban settlements – Veliki Crljeni and Rudovci. The economic basis of the development of the municipality are mining-energetic and industrial complex, and agriculture. Contrary to the villages of Obrenovac and Belgrade which are compact and semi-compact, the villages of Lazarevac are dispersed. Suburban settlements are getting demographically larger and functionally transformed. Most of the rural settlements are functionally transformed from agrarian into industrial. The region is very rich in coal (lignite). Near Lazarevac there is a famous mine "Kolubara" with a thermal power plant in Veliki Crljeni, as well as with the coal drying plant and the heating plant in Vreoci. The mine basin of "Kolubara" bases its development perspective on opening the excavation sites of large capacities. Thus, the expropriation of Vreoci settlement was initiated in order to expand the "D" surface excavation site. The exploitation of lignite in the central part of the municipality of Lazarevac was the cause for dying out of some settlements (Baroševac, Zeoke, and Medoševac) and for the resettlement of population (Sakulja and Cvetovac). The participation of "Kolubara" thermal power plant in Veliki Crljeni in the production of electrical energy in Serbia is small, but it is of great importance since it supplies Kolubara mining basin, as well as important long-distance transmitting lines which supply a part of Belgrade, the long-distance transmitting line for the supply of thermal power plant Nikola Tesla A, the long-distance transmitting line for Aranđelovac, etc.

Mladenovac (around 24,000 inhab.) is the center of the municipality of the same name which comprises 22 settlements with more than 54,000 inhabitants. The rural settlements are characterised by intensive, often stationary deagrarianisation and functional transformation from agrarian to agrarian-industrial and industrial-agrarian settlements.

Barajevo (over 9,000 inhab.) is the center of the municipality of the same name which has 13 settlements, none of which has urban functions or urban attributes pronounced enough. The settlements of this municipality are functionally directed toward providing services to local population, and to the population of Belgrade and transit population.

Sopot (around 2,000 inhab.) is an urban settlement with the function of a municipal center. It is the center of the municipality with 17 settlements, 14 of which are depopulation-affected. Sopot, with its functional power and the level of industrial development, was not capable of attracting all the non-agricultural population, so they moved to functionally more developed centers (Mladenovac, Smederevo, and Belgrade). Within the metropolitan, this municipality has preserved most of the rural attributes. The majority of the rural settlements in this municipality have the agrarian function as a dominant one.

This group also comprises the rural settlements of **Grocka** (over 8,000 inhab.) It is the center of the municipality with 15 settlements which are demographically growing (around 84,000 inhab.) and functionally diversifying. Grocka is the local service center, so its population satisfies it needs of regional services in Belgrade.

Surčin (over 18,000 inhab.) is a rural settlement in the municipality of Surčin, the youngest of all the 17 municipalities of the City of Belgrade. It was formed in 2004 by the separation from the municipality of Zemun. It comprises 7 settlements, with 42,000 inhabitants. The most important facility of the traffic and socio-economic infrastructure on the territory of the municipality is certainly "Nikola Tesla" international airport. Two thirds of the area of the municipality is agricultural land.

Next in the hierarchy are the Centers of settlement communities (CSC), or the secondary centers of the municipalities for the settlements which have the status of primary rural settlements according to their nonexistent (or modest) equipment with public services. CSCs are of more developed – urban type, or they are rural service-providing centers (Map No. 1) for its gravitational surroundings. The lowest status in the hierarchy is characteristic for rural settlements, and it is presumed that their population gravitates toward the nearest CSC.

NATURAL POTENTIALS AND LIMITATIONS

PRIMARY NATURAL POTENTIALS

Fertile soil represents one of the most important potentials of every region. The main purpose of fertile soil is agricultural production which has a positive impact on other industry branches in this area.

Agriculture as a production activity is an integral socio-economic activity. The total area of agricultural land on the territory of the administrative region of Belgrade is 218,055 ha (the largest part of agricultural areas are in the municipalities of Palilula and Obrenovac). On the territory of the City of Belgrade there are also urban municipalities with no agricultural areas (Vračar, Savski Venac, Stari Grad).

Underground waters as a resource are specific by its relative renewability. Regardless of that feature, until now they have largely been neglected in comparison with surface waters, especially in the segment of providing the necessary quantities of water for the needs of water supply. The largest part of the necessary quantities of underground waters was obtained from the alluvial layers of large water courses (Sava, Danube, Tamnava, etc.), where the situation was such that they were waters of lower quality, which was the consequence of the long-lasting, uncontrolled disposal of solid and liquid waste materials into the areas predisposed for the formation of water sources (Spatial Plan of the Republic of Serbia, 2010).

On the territory of Belgrade there are 9 underground rivers and streams: Mokroluška River, Slavuj Stream (Slavujev potok), Vračar Stream (Vračarski potok), Bibija Stream (Bibijin potok), Monastery Stream

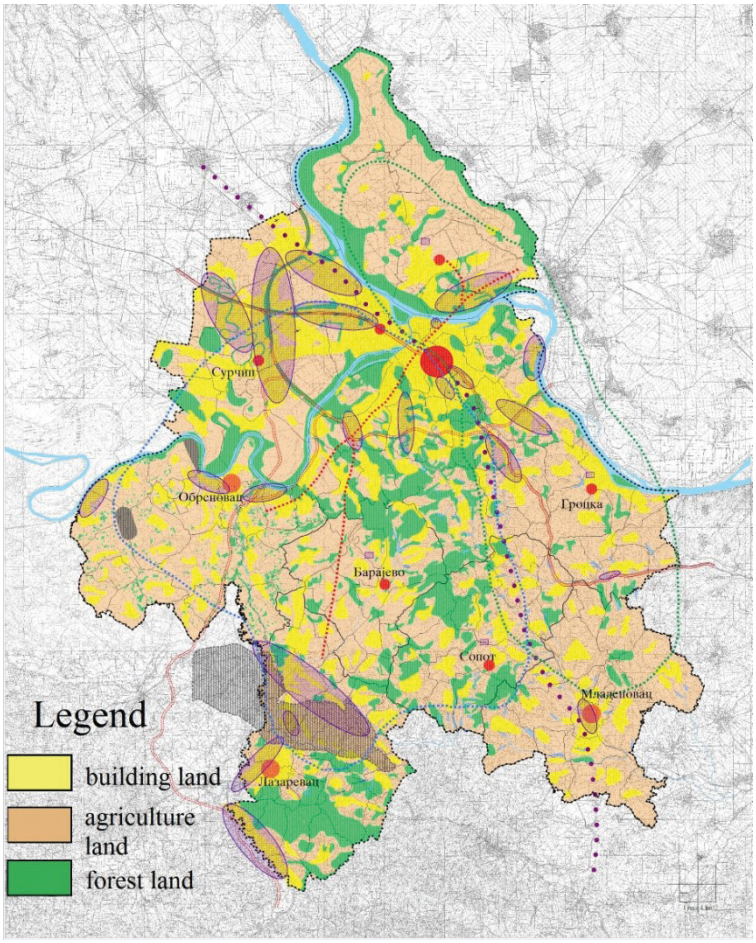


Figure 3: The purpose of land on the territory of the City of Belgrade
Source: Regional Spatial Plan for the City of Belgrade, 2011.

(Manastirski potok), Galovica, and Višnjica Stream (Višnjički potok). This natural potential is very important – it is necessary to use the underground waters for the purpose of supplying drinking water to the population because they are cleaner than surface water courses.

Mineral resources are relatively diverse on the territory of the City of Belgrade and, in the context of deposits of certain mineral raw materials, they are extremely important. The greatest value is the one of the reserves of lignite in the Kolubara basin, whereas the group of nonmetal mineral raw materials are significantly less important. The Kolubara basin, which stands out as a special geological-economic phenomenon, because, besides lignite, it contains large reserves of several nonmetal mineral raw materials, which have been unjustifiably underused up to date.

Based on the spatial arrangement of the reserve sites of mineral materials and mining production, three zones can be distinguished on the territory of the City of Belgrade: the zone of the City of Belgrade with wider surroundings up to 20 km to the south; the zone of Kolubara coal basin and its surroundings; the central zone south of Ripanj. The ones that are exploited today are the following: Brajkovac granodiorite massif in the municipality of Lazarevac, the source of breccia marble in Ropočevo, gravel excavation in "Tamnava" within the Kolubara basin, refractory brick clay and other clays in Kolubara and Mladenovac basins (Regional Spatial Plan for the City of Belgrade, 2011).

Mineral raw material base of lignite in the Kolubara coal basin still remains to be the basis of the dominant part of electric energy production in the future, not only in the region of the City of Belgrade, but in the whole Republic of Serbia (Regional Spatial Plan for the City of Belgrade, 2011).

SECONDARY NATURAL POTENTIALS

Secondary natural potentials have less influence on the development and prosperity of the given region, but their impact cannot be completely neglected.

The two largest, and thus the most important, ***surface water courses*** on the territory of the City of Belgrade are the Sava and the Danube. The Danube, as the most significant navigable river in Europe, which is navigable along its entire course through Serbia, has an enormous potential, both for the water borne transport and for tourism purposes. All the parts of the network of internal navigable routes are directly or indirectly related to the Danube, which, as a strategic route, should become the center of the largest transport routes in Serbia (Regional Spatial Plan for the City of Belgrade, 2011).

The level of research of ***thermal and mineral waters*** on the entire territory of the City of Belgrade is extremely diverse. Thus, in certain municipalities, there is not even the minimum of data on the research of this kind, whereas in some other municipalities (Mladenovac) these waters have partly been researched. In the areas belonging to the municipality of Zemun, the existence of thermal waters has been determined; in the municipality of Stari Grad there are springs of underground thermal waters; in the municipality of Palilula there is a spring of mineral water in Višnjička Banja. In Ovča, thermal-mineral waters flow freely and there is no kind of organised usage, but they are only used by the local population. In the municipality of Voždovac, the appearance of hot water has been registered in "Braća Jerković" settlement. The water flows freely and there is no organized use. In the municipality of Grocka, thermal-mineral water has been registered in Boleč, Ritopek, Leštani, Vinča, Vrčin, in the valley of Zavojnička River by the highway Belgrade-Niš, and in the eastern bottom of Avala mountain, the appearance of thermal waters was also registered (Regional Spatial Plan for the City of Belgrade, 2011).

The total area of ***forests*** and forest cultures on the territory of Belgrade is 35,980 ha. The level of forest coverage is 11.2%, with the differences in the forest coverage in various municipalities. In the region of Belgrade there are territories with no forest areas (Vračar, Stari Grad), but there are also regions where the level of forest coverage is very high (Barajevo, Voždovac, Lazarevac, Čukarica). The forests in the region of the City of Belgrade can be classified into two categories: city forests (Zvezdara, Banjička Forest, Topčider, Torlak, Košutnjak, Miljakovac, Makiš, and Ada Ciganlija, forests by the highway Belgrade-Zagreb to Surčin) and suburban forests.

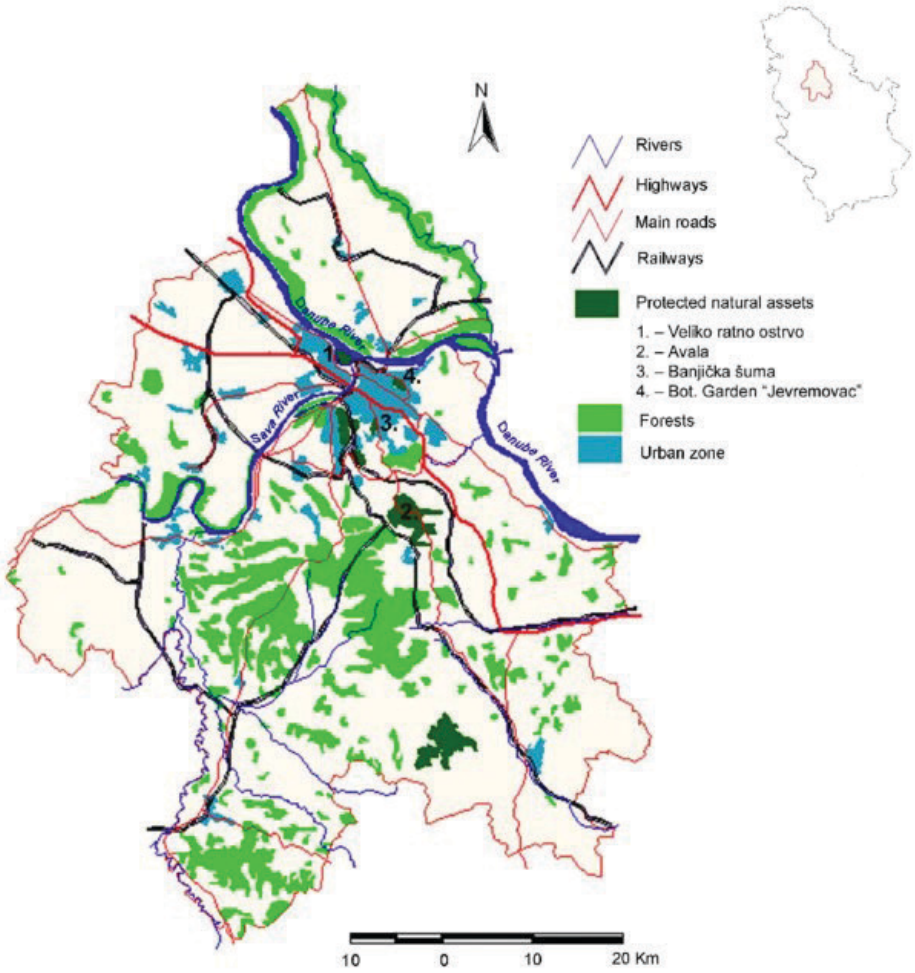
The ***landscapes*** of the City of Belgrade are a part of the authentic national and European heritage. Their value lies in its diversity, its connection with the past, its natural and cultural heritage, biodiversity, and finally, in its character as an element of the cultural identity. Observed by their characteristics, the values of the landscapes have been defined within eleven different types of landscape in the region of the administrative region of the City of Belgrade: alluvial plateau of Pančevo Marsh (Pančevački rit),

loess and loessoid plateau of South Srem, alluvial plateau of South Srem, alluvial plateau of Makiš and Ada Ciganlija, alluvial plateau of the lake surface of Posava-Tamnava and the lower course of the Kolubara, alluvial plateau of the middle course of the Kolubara and the valley of the river Ralja, the Danube riverbank (lower part of the right bank of the Danube), hills and plateaus near the basin of the Sava, neogene hills in the course of the river Kolubara, hilly and hilly-mountainous region of northern Šumadija, and hills and plateaus in the basin of the Danube and the basins of the rivers Ralja and Lug (Regional Spatial plan for the City of Belgrade, 2011).

There are two important ***mountains*** in the region of Belgrade: Avala and Kosmaj. Avala and Kosmaj have been identified as Emerald areas and the region chosen for the daily butterflies (RBA) and, based on that, they have been included into the ecological network of Serbia. Avala has the total area of 502 ha. As a part of the ecological network, Avala is also significant for the only finding site of cinnabarite in Serbia (nearby, a new mineral was also discovered – avalite). The region of extraordinary characteristics "Kosmaj" was declared protected in 2005. The total area of the protected area is 3,514.5 ha (The Spatial plan of the region of the special purpose, the region of extraordinary characteristics Avala-Kosmaj, 2010).

PRIMARY NATURAL LIMITATIONS

On the territory of Belgrade, according to the occurrences of instability, the most common are ***landslides***. Landslides are present in natural conditions on the slopes, in river and stream valleys, but also along roads or other building constructions, where they appear due to the inadequate cutting of natural soil. On the territory of Belgrade numerous slides of land masses are present in the areas in the southwest of Avala, starting from Ostružnica towards Obrenovac, in the southeast, east, and northeast of Avala, starting from Bregalnica, then



Map 4: Protected natural areas in Belgrade
Source: Djurdjić, Stojković and Šabić, 2011

along the Danube in Ritopek, Višnjica and Mirijevo Stream (Mirijevski potok), i.e. in the areas built of neogene sediments. In artificial cuttings, due to the loss of natural moisture, openings appear, and cut-offs along the cracks and larger blocks during the constructions of collectors and roads in the settlement of Kumodraž in delluvial-prolluvial clays, during the construction of buildings in the settlement of Miljakovac in pre-tortonic "pied series", as well as in the construction of the facility Makiš - upper tier (in Čukarica) in the tectonic cracked zone of limestone marl. Cutting in such areas require the mandatory shoring during the construction works (Regional Spatial Plan for the City of Belgrade, 2011).

The plain zones of the City of Belgrade are the defence from the high waters of the rivers Sava and Danube, with about 130 km of embankment, 95 km of which have been reconstructed, but they are still not sufficiently protected from ***floods***. Especially endangered is the so-called Novi Beograd-Zemun "cassette", which is defended by the embankments on the river Danube, in the length of around 44.5 km, and then from the confluence of the Sava into the Danube to Kupinovo, in the total length of about 50 km. The plain regions of the City of Belgrade, especially in the northern part, in the zone of the rivers Danube and Sava, are endangered by the so-called ***inner waters*** (underground waters and precipitation waters which cannot drain from the closed surfaces). Pančevački Rit is the most complex system, with the gross area of around 34,000 ha. It is divided into 7 defended surfaces, with the total length of canal network of about 870 km, with the network density of about 25 m/ha. The evacuation of superfluous waters is accomplished through 6 drainage stations whose installed capacity is about 26 m^3/sec. The drainage stations do not meet the criteria of intensive drainage. In the region of Makiš, with the area of about 5,000 ha, the drainage systems exist on about 2,500 ha, with the canal network and one drainage station (4m^3/sec). In Posavina (the basin of the river Sava) and in the valley of the Kolubara river in the region of the municipality of Obrenovac, the problem of inner waters is quite serious, which is why 9 drainage systems have been built within the protected cassettes, on about 21,000 ha.

SECONDARY NATURAL LIMITATIONS

The complex topography of Belgrade also reflects on the differences in the types of ***fog*** in certain topo-climatic zones of the city. According to the observations in Vračar meteorological observatory (altitude of 132 m), and based on the Climate Atlas for the period of 30 years – the annual number of days with fog in Belgrade is 39. It is interesting that Zeleno Brdo Observatory behaves like a "mountain" station. There, in winter, the fog is about 30% more frequent than on Vračar, even though it is quite far away from the source of pollution.

The wider area of Belgrade is located at the intersection point of three macro-tectonic blocks according to seismic-tectonic and neo-tectonic map: Pannonian depression, Vardar zone, and the Zone of horsts and grabens of the inner Dinarides. The largest number of active faults is relatively small in length (20–30 km), which implicitly assumes the relative small quantity of the maximum potential seismic energy that can be accumulated in them. Thus, the relatively ***seismic stability*** of the City of Belgrade is also affected by the near vicinity of the more deeply set and stable seismic blocks, of Srem and Banat. Seismically active region is located in the region of Šumadija, south and southeast of the City of Belgrade. According to the legislation in force, the region of the City of Belgrade belongs to the region with a moderate level of seismicity. The territory of the City of Belgrade does not have its autochthonous focal points for strong earthquakes (Regional Spatial Plan for the City of Belgrade, 2011).

In the municipalities of Mladenovac and Sopot there are problems with water supply due to the ***lack of drinking water*** in these areas. In the municipality of Mladenovac, due to serious problems in water supply both because of the quantity and the quality, the long-lasting solution is its connection to the regional system of Belgrade water supply. The works on the arterial water pipeline "Makiš" - Mladenovac have started. The municipality of Sopot has difficulties in meeting the current needs of the settlements.

The quality of water in the City of Belgrade has been jeopardised by draining the unpurified municipal and industrial waste waters into the recipients, the drain waters from landfills, navigation on the rivers, and the work of thermal power plants. The industrial facilities located in the urban zones drain the waste waters into the city sewage systems, most often without any pre-treatment. A serious problem is the pollution from drain and overflow waters from the depots of ash. The overflow waters get into the water courses, and the drain waters flow underground and pollute the underground waters.

Thermal pollution affects the water course of the Sava downstream from Obrenovac. Almost all the smaller surface water courses in the area of the City of Belgrade are in water class 2. Microbiological pollution of the waters of smaller rivers and canals is very high due to the inflow of sanitary waste waters. Except the waters of the Sava and the Danube, all the other water courses sometimes deviate in terms of bacteriological or physical-chemical irregularities. Also, it is necessary to point out that Belgrade is the only capital city in Europe which does not have a plant for the treatment of waste waters. Belgrade drains all its waste waters directly into the Danube and the Sava (Regional Spatial Plan for the City of Belgrade, 2011).

DEMOGRAPHIC CHARACTERISTICS OF THE CITY OF BELGRADE

The territorial arrangement of population in Belgrade is characterised by evident unevenness, since about 80% of the population live in the municipalities of continuous or inner urban territory of the City, and only around 20% live in the municipalities of the suburban zone of the City.

The municipalities which comprise the inner city center, such as Savski Venac, Stari Grad, and Vračar, record the constant decrease in the number of inhabitants. The municipality of Stari Grad lost about 15,000 inhabitants in the period 1991–2002. This negative trend represents a phase in the urbanisation in which the population moves out of the central city zones, which transform into the central business zone (Central Business District). One of the reasons is also the tendency or the need of the population to move out of the central city zones, in which the land and the accommodation are much more expensive, to the periurban zones where the prices are lower and the quality of the environment is better. Furthermore, this negative trend is the consequence of unfavorable age structure of the population (dominantly old population), and as a consequence of that is also the negative population growth rate.

While the situation on the level of municipalities is relatively favorable, the unfavorable trends within the municipalities themselves should be

Table 3: The change in the number of inhabitants in the region of Belgrade in the period from 1981 to 2011

MUNICIPALITY	Comparative overview of the number of inhabitants				The change of the number of inhabitants			The change rate of the number of inhabitants		
	1981.	1991.	2002.	2011.	1981-1991	1991-2002	2002–2011	1981-1991	1991-2002	2002–2011
Barajevo	18,815	21,647	24,641	27,110	2,832	2,994	2,469	14.00	11.76	10.60
Voždovac	157,593	159,382	149,744	156,212	1,789	-9,638	6,468	1.13	-5.67	4.70
Vračar	78,862	69,680	58,386	56,333	-9,182	-11,294	-2,053	-12.36	-16.03	-3.98
Grocka	54,599	69,448	75,466	83,907	14,849	6,018	8,441	23.94	7.55	11.77
Zvezdara	128,753	140,483	132,621	151,808	11,730	-7,862	19,187	8.71	-5.23	14.99
Zemun	138,591	146,056	152,831	168,170	7,465	6,775	15,339	5.25	4.12	10.62
Lazarevac	51,095	58,882	58,511	58,622	7,787	-371	111	14.16	-0.57	0.21
Mladenovac	52,489	56,389	52,508	53,096	3,900	-3,881	588	7.16	-6.48	1.24
Novi Beograd	173,541	224,424	217,773	214,506	50,883	-6,651	-3,267	25.57	-2.73	-1.68
Obrenovac	62,612	70,234	70,975	72,524	7,622	741	1,549	11.47	0.95	2.40
Palilula	150,484	156,587	155,902	173,521	6,103	-685	17,619	3.97	-0.40	11.89
Rakovica	87,067	97,752	99,000	108,641	10,685	1,248	9,641	11.56	1.15	10.32
Savski Venac	53,374	47,682	42,505	39,122	-5,692	-5,177	-3,383	-11.27	-10.44	-9.21
Sopot	20,860	20,527	20,390	20,430	-333	-137	40	-1.61	-0.61	0.22
Stari Grad	73,767	70,791	55,543	48,450	-2,976	-15,248	-7,093	-4.12	-21.94	-15.16
Surčin	33,706	35,636	38,814	43,819	1,930	3178	5,005	5.57	7.76	13.46
Čukarica	132,123	154,632	168,508	181,231	22,509	13,876	12,723	15.70	7.81	8.08

Source: The Statistical Office of the Republic of Serbia, Census Register Book No. 20, 2014

considered. The municipalities of the suburban zone are characterised by a large number of settlements, and thus the number of inhabitants on the level of a settlement is smaller. Also, small settlements (with fewer than 1,000 inhabitants) mostly record a fall in the number of inhabitants, whereas larger settlements and municipal centers record a mild increase. The reason for this is that the population from smaller settlements, with low equipment of infrastructure and public services move to larger and better equipped settlements, primarily to the municipal centers, and then to the settlements with a better position in relation to the center of Belgrade, as well. For example, the settlements with the highest rate of population growth are in the municipality of Grocka: Kaluđerica, Leštane, and Vinča, which are located next to the urban border of Belgrade.

In order to properly interpret and understand the change of the number of inhabitants in a region, it is important to analyse the relation between the natural and migration components of such a change. The kinds of population migrations belong to a group of complex indicators of demographic development. Summing up the differences in the population growth and migration movements in the period between two censuses, a clear overview is obtained about the general trends in socio-economic changes. The migration of the inhabitants of a region is the reflection of its development stage, so according to that indicator, we can also notice the trends of the settling rate of a region as a function of the regional development. Eight types of population migration can be distinguished, and they can be classified into two main groups, **immigration**[1] and **emigration**[2]**:**

I1 – expansion by immigration; **I2** – regeneration by immigration; **I3** – low regeneration by immigration; and **I4** – very low regeneration by immigration.

E1 – emigration; **E2** – depopulation**; E3** – extreme depopulation; and **E4** – dying out.

Belgrade municipalities are classified into four out of eight types of migrations. On the whole territory

[1] **I1** - growth recorded by the census, population growth rate positive, migration rate positive; number of inhabitants grows faster than the natural dynamics thanks to immigration; **I2** - growth recorded by the census, population growth rate negative, migration rate positive; number of inhabitants grows thanks to large immigration; **I3** - growth recorded by the census, population growth rate negative, migration rate positive; the migration rate of population is smaller than the rate of population growth; immigration prevents serious decrease of the number of inhabitants; and **I4** - a decrease recorded by the census, population growth rate negative, migration rate positive.

[2] **E1** - growth recorded by the census, population growth rate positive, migration rate negative; **E2** - decrease recorded by the census, population growth rate positive, migration rate negative; population growth rate is higher than the decrease in the number of inhabitants; **E3** - decrease recorded by the census, population growth rate positive, migration rate negative; population growth rate is smaller than the rate of the decrease in the number of inhabitants; and **E4** - decrease recorded by the census, population growth rate negative, migration rate negative.

Table 4: Types of migrations

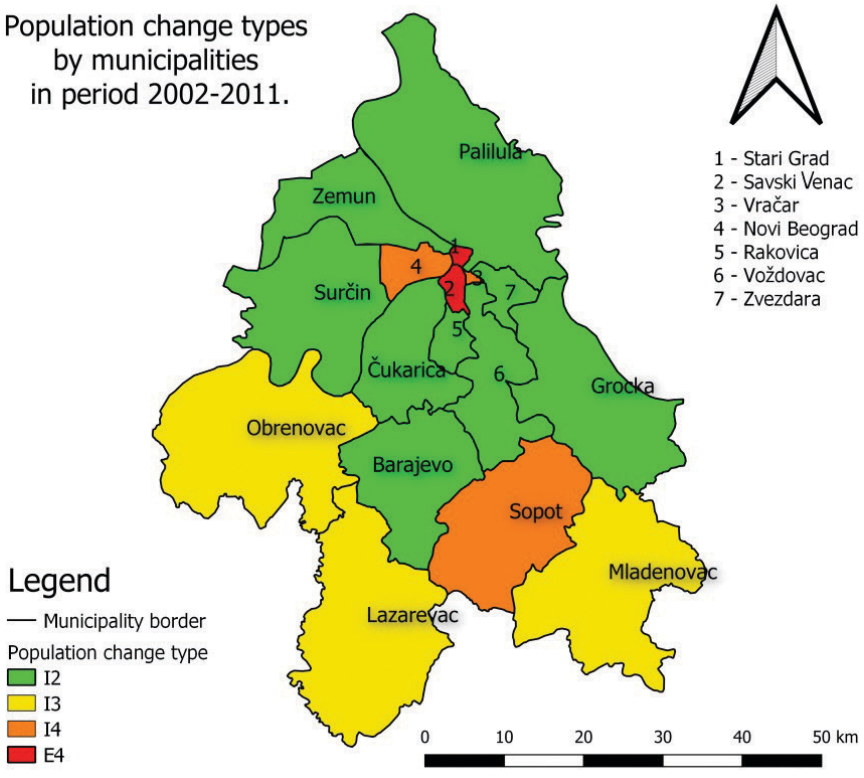
MUNICIPALITY	Number of inhabitants		Change in the nb. of inhabitants	Change rate	Born alive 2002–2011	Died 2002–2011	Population growth	PG rate	Migration rate	MIGRATION TYPE
	2002.	2011.								
Barajevo	24,641	27,110	2,469	10.60	2,450	3,807	-1,357	-5.83	16.43	I2
Voždovac	149,744	158,213	8,469	6.11	15,232	19,965	-4,733	-3.42	9.53	I2
Vračar	58,386	56,333	-2,053	-3.98	5,143	9,107	-3,964	-7.68	3.70	I4
Grocka	75,466	83,907	8,441	11.77	8,281	8,372	-91	-0.13	11.90	I2
Zvezdara	132,621	151,808	19,187	14.99	15,613	16,970	-1,357	-1.06	16.05	I2
Zemun	152,831	168,170	15,339	10.62	18,161	18,860	-699	-0.48	11.10	I2
Lazarevac	58,511	58,622	111	0.21	6,145	7,685	-1,540	-2.92	3.13	I3
Mladenovac	52,508	53,096	588	1.24	5,283	7,736	-2,453	-5.16	6.40	I3
Novi Beograd	217,773	214,506	-3,267	-1.68	21,191	25,283	-4,092	-2.10	0.42	I4
Obrenovac	70,975	72,524	1,549	2.40	7,533	9,694	-2,161	-3.35	5.75	I3
Palilula	155,902	173,521	17,619	11.89	18,239	19,915	-1,676	-1.13	13.02	I2
Rakovica	99,000	108,641	9,641	10.32	10,333	11,900	-1,567	-1.68	12.00	I2
Savski Venac	42,505	39,122	-3,383	-9.21	4,558	6,649	-2,091	-5.69	-3.52	E4
Sopot	20,390	20,367	-23	-0.13	1,832	3,271	-1,439	-7.85	7.72	I4
Stari Grad	55,543	48,450	-7,093	-15.16	5,128	8,757	-3,629	-7.75	-7.40	E4
Surčin	38,814	43,819	5,005	13.46	3,997	4,334	-337	-0.91	14.37	I2
Čukarica	168,508	181,231	12,723	8.08	18,578	19,174	-596	-0.38	8.46	I2

Source: The Statistical Office of the Republic of Serbia, Census Register Book No. 20, 2014

of Belgrade there is a negative population growth rate caused by the low birth rate. It means that the growth in the number of inhabitants in certain municipalities can be described exclusively by the immigration of people to Belgrade.

The municipalities and parts of municipalities that comprise the settlement of Belgrade have a negative population growth rate, so the number of their inhabitants is growing due to immigration (population density). The municipalities of Savski Venac and Stari Grad, except the negative population growth rate, also record a negative migration rate (depopulation). That is the reason why these two municipalities belong to E4 emigration type, which signifies dying out. Then, the municipalities of Novi Beograd and Vračar have a bit better position since they belong to I4 immigration type, which means that their number of inhabitants is regenerated by the immigration of inhabitants, but the regeneration is quite low. Other municipalities and parts of municipalities that make up the urban settlement of Belgrade belong to I2 immigration type, which represents the regeneration by immigration. The municipalities of the suburban zone of the City have various characteristics and are divided into three immigration types. The municipalities of Surčin, Barajevo, and Grocka belong to I2 immigration type. The municipalities of Obrenovac, Lazarevac, and Mladenovac belong to I3 immigration type (low regeneration by immigration), whereas the municipality of Sopot belongs to I4 immigration type. The fact that the municipalities of Surčin, Barajevo, and Grocka have better performances than other suburban municipalities could be explained by their position, that is, by their close vicinity to the urban tissue of Belgrade, and as such, they are more appealing for immigrants.

Thus, the fact is that the territory of Belgrade has a negative population growth rate. The age structure of the City of Belgrade is characterised by a large share of old people. There is a larger number of old people in comparison with the people younger than 19 years of age. Namely, the share of people older than 60 in all the Belgrade municipalities is larger than of the people younger than 19, and the exception are the municipalities of Lazarevac and Surčin where the values are almost equal. In some of the municipalities this difference is almost twice larger. In the settlement of Belgrade every fourth inhabitant is older than 60. Also, the worrying fact is that a half of the population of Belgrade depends on the economically active population (aged 19–65).



Map 5: Types of migrations for the period 2002–2011
Source: Authors' independent data processing

The data from the Statistical Office of the Republic of the Republic of Serbia, Census Register Book No. 7, 2013) show that the economic structure on the territory of the administrative region of Belgrade is more favorable in comparison with the average in Serbia. Namely, the share of people who work in the total number of active population (81.52%) is larger than the average for Serbia, and on the state level it is 77.56%. At the same time, the share of unemployed people (17.38%) is smaller than the state average (22.43%).

The service-providing sector is the dominant sector of activities on the territory of the administrative region of Belgrade. The municipalities which comprise the urban core show the absolute domination of the tertiary sector, where the most prominent ones are the municipalities of Vračar, Stari Grad, Savski Venac, and Novi Beograd. The reason for this is that these municipalities are the ones which make up the central business zone of Belgrade. They are the home of numerous business-shopping facilities, of the head offices of a large number of foreign banks and companies, the largest Belgrade hotels, and the municipality of Novi Beograd additionally stands out with its vast areas of building areas and good infrastructure equipment. With over 85% of people employed in the tertiary sector, the industry of these municipalities is almost mono-structural. Industrial production has been preserved in the municipalities of Zemun, Palilula, Čukarica, and Rakovica.

In Zemun and Rakovica the largest industrial zones of Belgrade are located. However, during the transition process, these municipalities also turned toward the activities in the tertiary sector. The fact that the employment rate in the tertiary sector has largely exceeded the employment rate in the secondary sector can be observed as a favorable condition since it demonstrates the following of trends of the developed countries which are the results of technological-information revolution (the Statistical Office of the Republic of Serbia, Census Register Book No. 15, 2014).

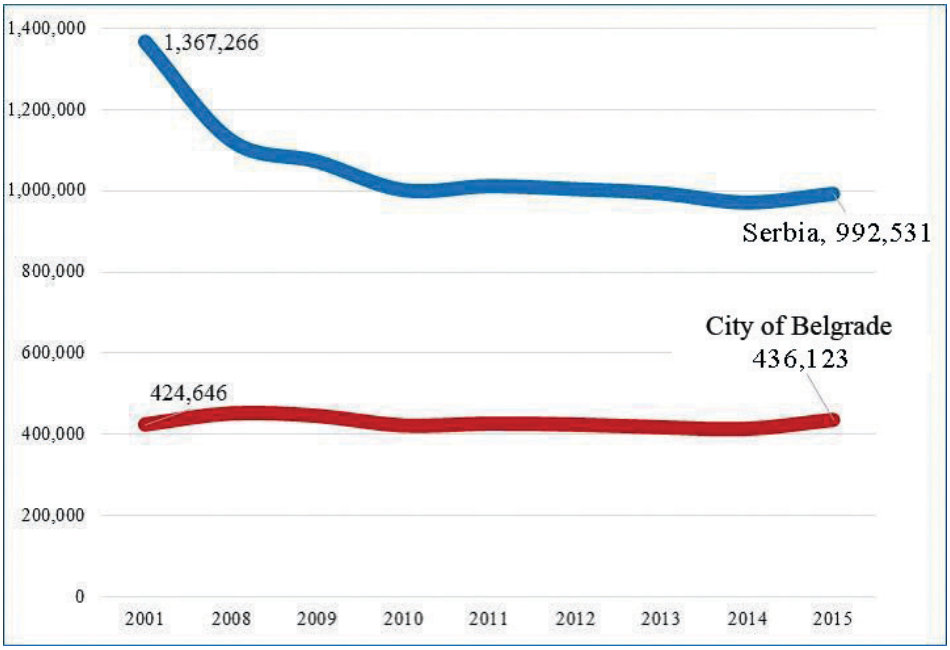


Figure 5: The changes of the number of people employed in the industry of the City of Belgrade, 2001–2015
Source: The development strategy of the City of Belgrade by 2021, 2017

TRAFFIC AND TRANSPORT IN THE CITY OF BELGRADE

Belgrade is a city with 7,000-year-long history, which makes it one of the oldest cities in Europe. The city lies at the intersection of Pan-European Corridors 7 and 10, as well as on the corridor that connects Romania, Serbia, Montenegro, and Italy. The central position of Belgrade is also proved by its distance from other cities in the region: Budapest 369 km, Sofia 379 km, Zagreb 394 km, Skopje 440 km, Sarajevo 325 km, Podgorica 450 km, Ljubljana 530 km, and Bucharest 614 km.

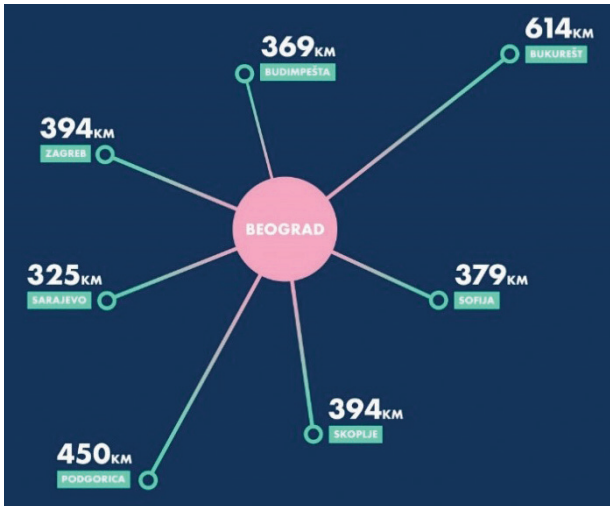


Figure 6: The distance of Belgrade from other cities in the region
Source: http://beogradzivi.rs/Tema/a150-Grad-kranova-Beograd-zivi.html

Traffic and traffic infrastructure on the territory of the City of Belgrade represents an obviously present problem due to its insufficient development, construction, capacity capabilities, and at the same time, it represents a potential for the future development, i.e. one of the most significant factors for achieving the common goal, the arrangement and development of AR Belgrade and its metropolitan region, especially in achieving a more important regional position.

The main characteristics of the existing traffic infrastructure in the region of Belgrade metropolitan are the following:

- roads of international significance are only partly constructed with the elements of a highway, and the existing sections are mostly with an unsatisfying state of roads. The problem that stands out is the lack of the complete ring road which is in the construction phase:
- the equipment of the network of international roads with the operative and accompanying facilities (traffic and tourist signs, motels, service centers, gas stations, help service, information, etc.) is on the lowest organisational and technical-technological level;
- regional road network is also underdeveloped, and the existing one is not sufficiently maintained;

Figure 7: Map of European corridors through Serbia and Belgrade
Source: Vukićević M. et al., 2018)

- railroads are mostly with one track and with out-of-date technical elements and signalling-safety equipment, weak flow and low speeds;
- city suburban railway traffic due to the insufficient transport capacity, with trains stations not arranged or even not constructed, railroads not maintained and with irregular traffic has very low participation in the total transport of passengers, especially with the obvious lack of high-capacity of underground railway, a type of subway;
- long-distance and suburban traffic depends only on bus transport whose efficiency directly depends on the state of the road infrastructure and traffic load;
- underdeveloped systems which provide the accessibility to the traffic infrastructure and the use of means of transport by the disabled and the impaired people;
- the privilege which Belgrade airport has in terms of geographical position is underused. The facilities and capacities of the airport satisfy the needs of today's international passenger air traffic, but it lacks the adequate facilities and capacities for the traffic of cargo planes;
- port capacities do not have a defined status or a vision of the future development, and the existing ones are not equipped enough or not equipped at all for the modern container transport and for today's international multi-modal transport;
- the appropriate coordination of activities between Belgrade port and the ports in the metropolitan region (Pančevo, Smederevo) has not been established;
- passenger traffic on the rivers is reduced only to seasonal and tourist traffic, primarily of international character;
- the network of logistic centers is underdeveloped, the terminals of integral transport are in unfavorable locations and insufficiently technologically equipped, so Belgrade still cannot be referred to as a multi-modal junction.

Traffic-related problems:

- mono-centric development;
- inadequately and insufficiently developed network of the main corridors;
- lack of modern traffic management system;
- mixing of local transport with transit flows in central zones;
- lack of high capacity public transport;
- insufficiency of public and other use of parking capacities;
- absence of harmonized transport policy.

Of the planned solutions that were expected to be achieved at the end of the first decade of the 21st century, only the following few have been completed:

- reconstruction of the bridge on the ring road highway over the river Sava near Ostružnica;
- construction of the part of the ring road highway with the half of the profile from Ostružnica to Ibarska arterial highway;
- construction of the other road track of the international road E-75 in the section Belgrade-Novi Sad;
- reconstruction of the railway bridge over the river Sava near Ostružnica;

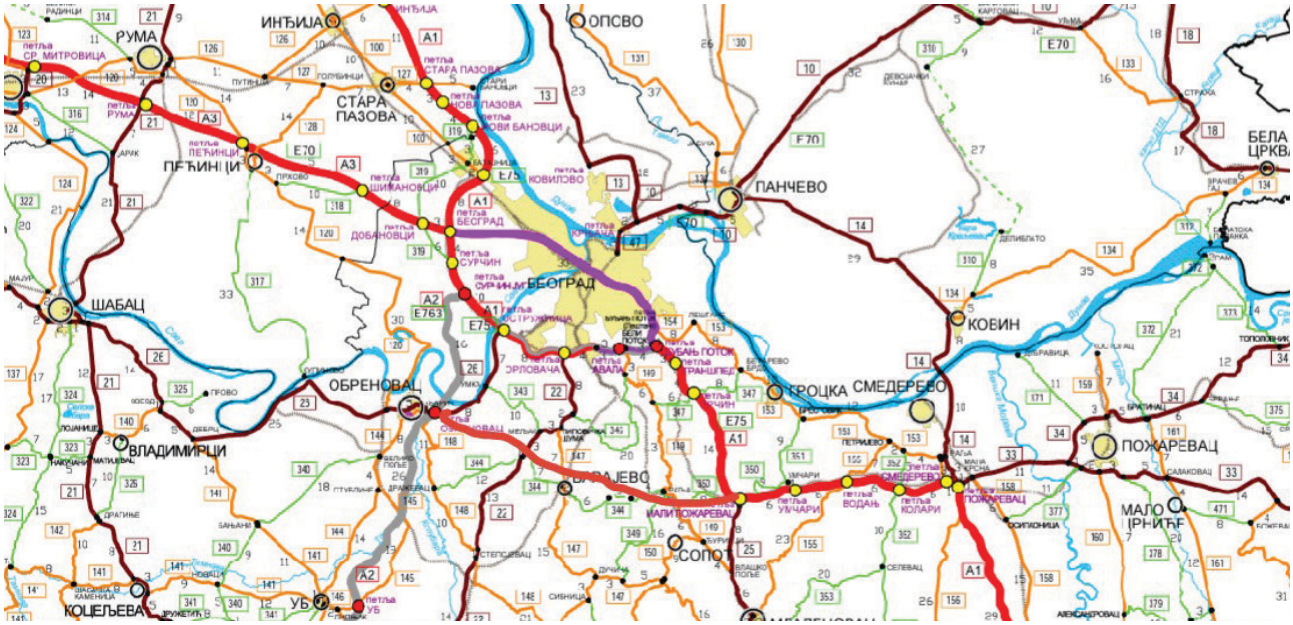


Figure 8: Road network in Belgrade region

- equipment of the airport for the transition into a higher category.

On the regional level, the traffic system of AR Belgrade is characterised by the existence of all the types of traffic of heterogeneous development and technological equipment and insufficient inter-connection (Amendments of the Regional spatial plan of the AR of the City of Belgrade, 2011).

The spatial division of travels in the city directly depends on the spatial division of the main activities in the city; it relates to travelling from/to the place of residence, travelling to work, to school, etc. The city is gradually changing from a mono-centric into a city with two important centers of activities which are located in the old city core and in Novi Beograd. Considering that trend, it is expected that the development will continue toward poly-centric expansion where the daily travels would not go only toward the center, but also toward the city outskirts. As the future develops, it is expected that this growth will result in the following:

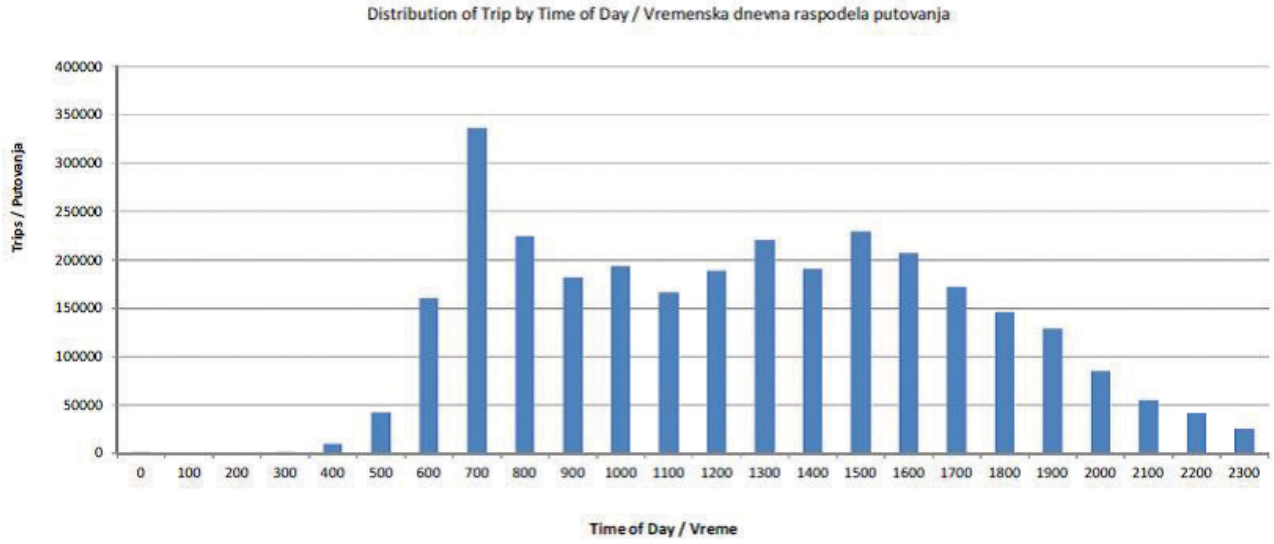


Figure 9: Distribution of trip by time of day
Source: SMARTPLAN, 2017

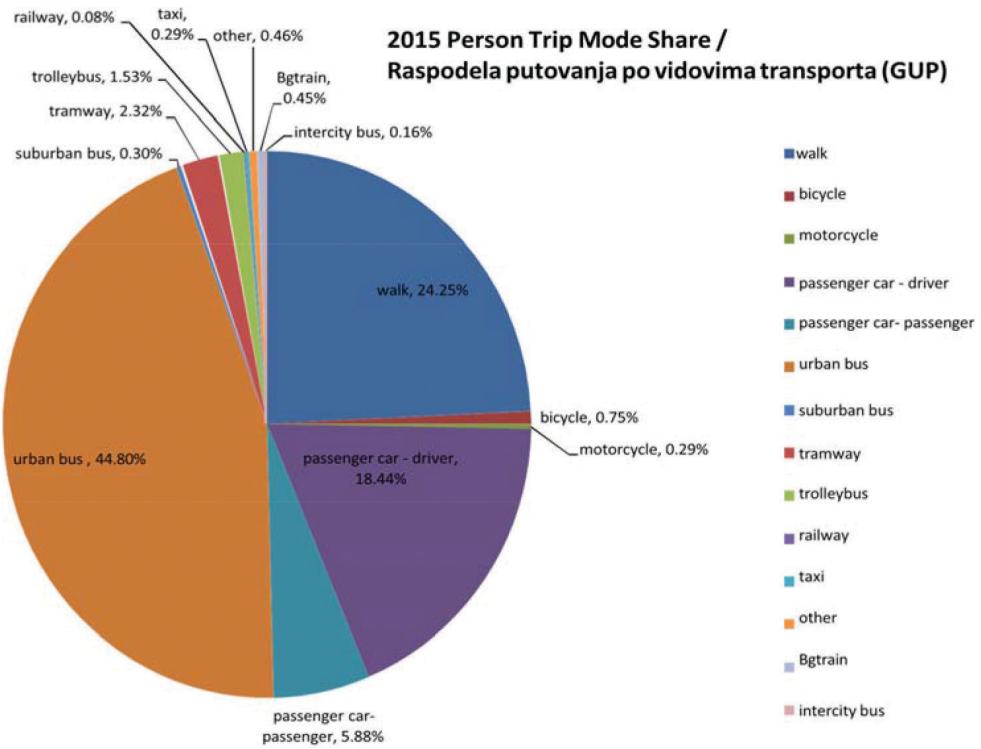


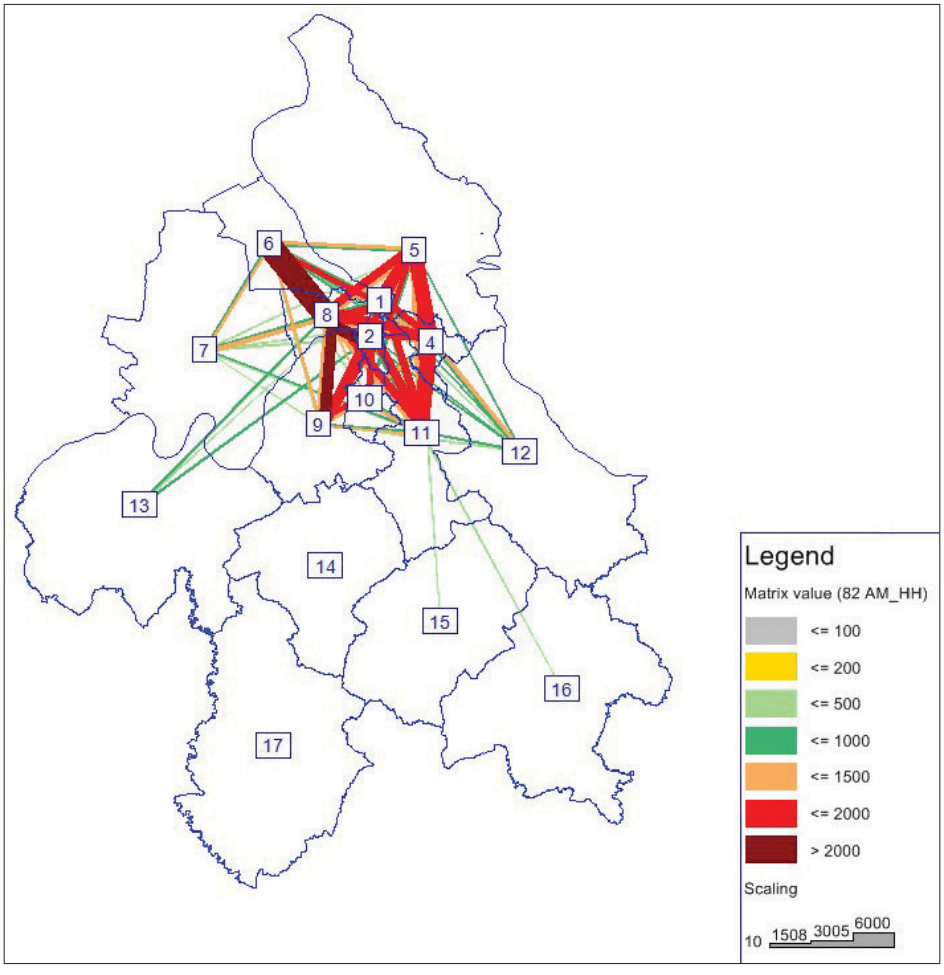
Figure 10: Person trip mode share
Source: SMARTPLAN, 2017

- Urban center: old city core of Belgrade which is densely populated and has a lot of work places in the public sector and education; Novi Beograd with the mixed new settlements and businesses (including retail, commercial and financial centers), and the center of Zemun (mostly residential with mixed business development); and
- Suburban settlements whose significance as the main growing residential zones, but also with the growth in the number of work places since the suburban settlements become the main employment centers by attracting business, production, and facilities for logistic centers (SMARTPLAN, 2017).

The public transport meets about 50% of the total demand for travelling in the city every day and represents the basis for a proper functioning of the city. In 2015, around 2.13 million passengers travelled by bus, trolleybus or tram. In the same year, the total annual number of passengers was 456.90 million.

As in many other cities, the dominant means of transport is a bus – in the city area it meets 44% of the total demand for travelling, whereas the share of trams is 2%, trolleybuses 1.3%, and railway 0.5% Even though the participation of public transport in the city has gradually reduced in the last decade to 48%, it is still on a very high level.

The transport infrastructure and services, especially in the area of public transport, have gone through serious changes in this period. The city has invested a lot in the expansion of the bus network, whereas the length of the tram and trolleybus network has been reduced through years. Despite the reduction in the coverage by tram and trolleybus network, the level of services for all the three means of public transport, measured by the number of seat-KM, it has significantly grown. Even though the tram and trolleybus network has been consolidated, the level of services has risen thanks to the higher frequency of vehicles and by introducing vehicles of larger capacities. This enhanced level of services clearly has a positive impact on the usage of public transport, where buses, trolleybuses, and trams showed the increase of participation from 2001 to 2015 (SMARTPLAN, 2017).



Map 6: The most important movements in the morning peak for 2015 (from sector to sector)
Source: SMARTPLAN, 2017

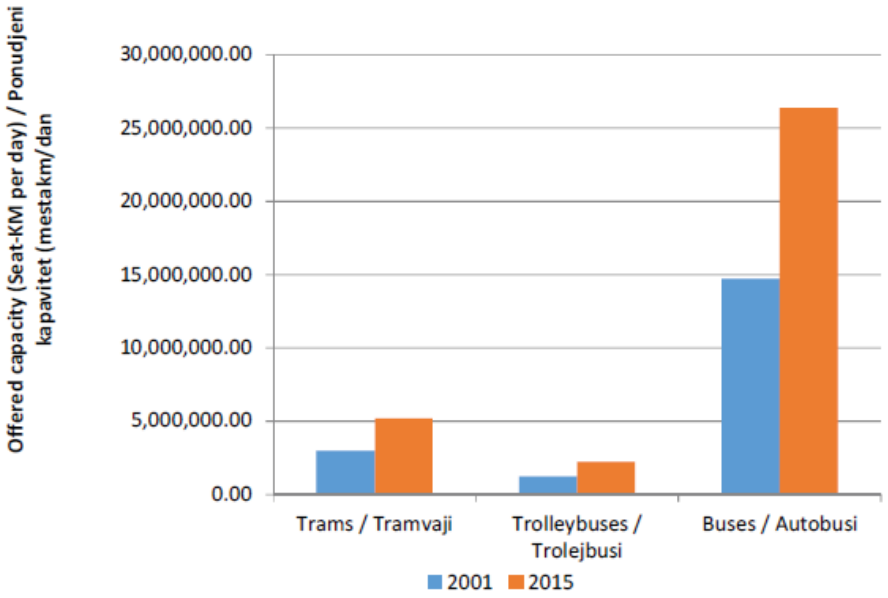


Figure 11: The comparison of the offer of the city public transport (seat-KM) in 2001 and 2015
Source: SMARTPLAN, 2017

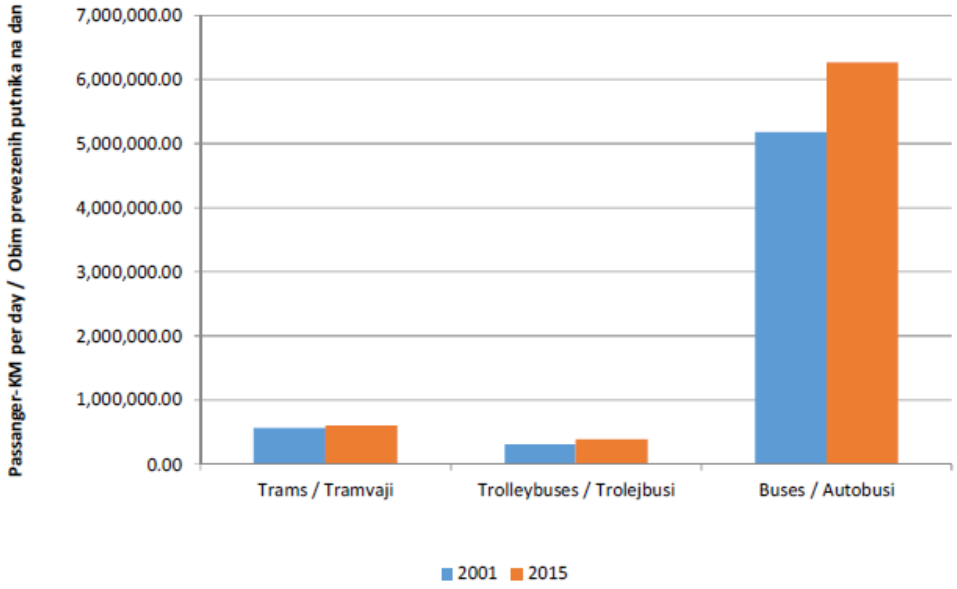


Figure 12: The comparison of the demand for the city public transport (passenger-KM) in 2001 and 2015
Source: SMARTPLAN, 2017

Despite the high level of investing in the city public transport, the city is at the crossroads in terms of the development of the city public transport and the mobility system. Thanks to the combined effects of the improved level of bus usage, the general lack of high-capacity roads and everyday growth in traffic quantity, it has been noticed that the speeds of the public transport are gradually decreasing. Also, it happens that the connection of a large number of buses and route overlapping, and lower operative speed are caused by the buses themselves, since they congest the corridors they move along (SMARTPLAN, 2017).

Taking into consideration the three dominant means of public transport that now operate in the conditions of mixed traffic (with the exception of the sections where there are yellow lanes and isolated tram islands), there is a limitation of the speed improvement capacities that could be applied to these systems. The improvements have been introduced constantly, such as the reduction of operational costs by introducing more efficient private carriers and the planned introduction of electric buses, but this results in negligible benefits. Bearing in mind the anticipated growth in the number of inhabitants, GDP, and employment, the city will need a change in the transport system in

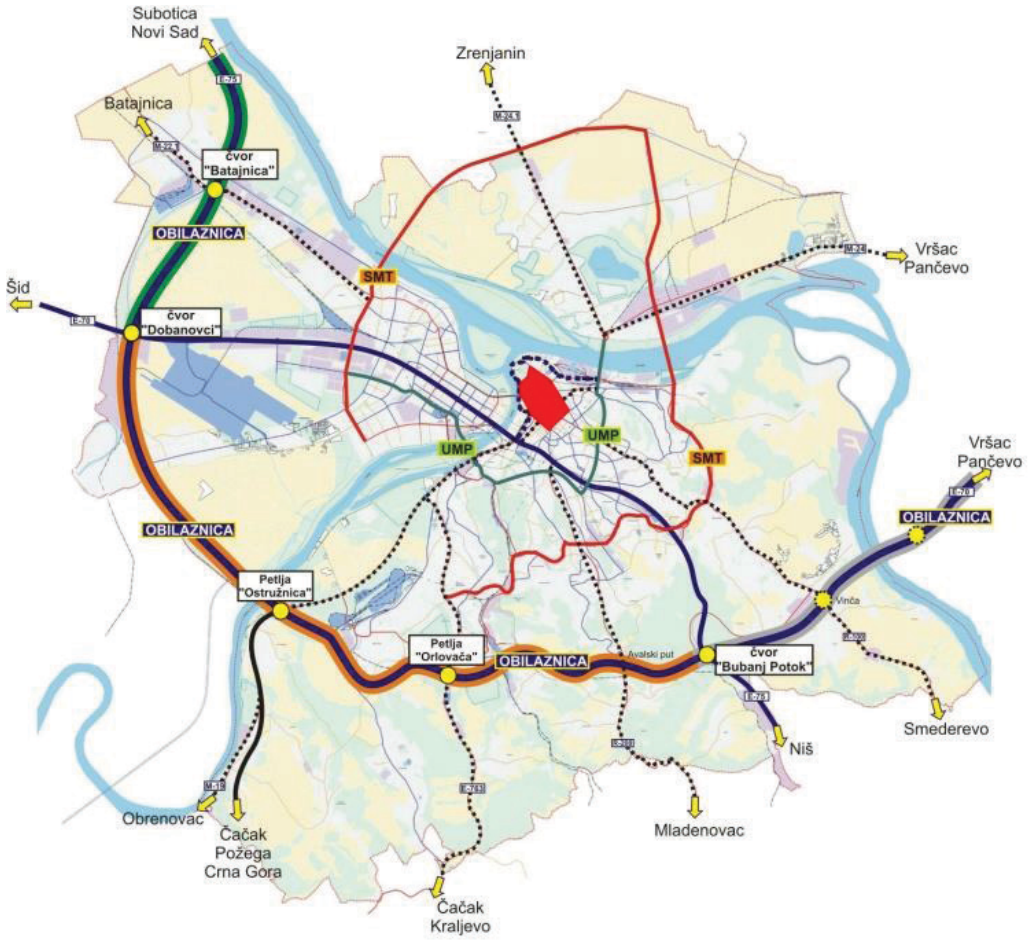


Figure 13: The key projects in the field of the construction of the traffic infrastructure
Source: Milenković, Kocić, 2017

phases and in the form of the new mass and fast system of public transport.

Thus, the two key projects in the field of the construction of the traffic infrastructure are: finishing the construction of fast roads through the city – internal arterial semi-ring (IASR) and the ring road around the inner and wider city core (external arterial tangent and the ring road). And Belgrade metro and BG train. The integral part of IASR is the Ada Bridge, and of the external tangent, the bridge on the Danube in Zemun. BG train would be added to the "Metro" (Subway) project as well, and thus, a new, high-capacity network of public transport would be created.

SOLUTIONS UP TO 2021

- Construction of about 132 km and reconstruction of 75 km of road and streets;
- **The first ring** around the narrowest central zone;
- **The inner city (semi)-ring road** (ICSRR) around wide central area of the city;
- **External main tangent around the City** (EMT);
- Construction of the **motorway bypass.**

Figure 14: Ada Bridge
Source: http://beobuild.rs/

INNER CITY SEMI-RING ROAD (ICSRR)

- To reduce in the city core of Belgrade: transport work, travel time, stop time at the interchanges with traffic lights, number of the vehicle stops at interchanges with traffic lights, and fuel consumption
- Length 17,077 m of which 2,895 m are in tunnels, 5,457 passed over bridges and 8,725 m are on surface.
- Total number of junctions is 22, of which 15 are grade separated.

UPON COMPLETION OF THE ICSRR

- **Savings of about 100,000 km passenger cars;**
- **11 tons of fuel a day/3,250 tons less per year;**
- **Till 2021, traffic of passenger cars increased by 35%;**
- **Savings in fuel consumption would be about 35 tons of fuel per day, or over 10,000 tons of fuel per year.**

THE IMPACT OF ICSRR ON THE ENVIRONMENT AND THE URBAN AMBIENT

- **Changes in the environment and landscape images;**
- **Landscape features will mostly be changed in part of natural elements**;
- **The smaller impact will be where the landscape is largely urbanized** - road itself can be visually 'fitted' into the urban structure**.**

THE ADA BRIDGE

- **The bridge is 929 m long, has 6 lanes of width 42.5 m.**
- New urban form.

TOURISM

The City of Belgrade, with its unique geographical position at the confluence of the Sava into the Danube, with Belgrade Fortress, natural beauties of the Great War Island (Veliko ratno ostrvo), Ada Ciganlija, Avala, Kosmaj, forests and getaway spots, tumultuous history, with its rich cultural and historical heritage from various periods, is the most important part of Serbia from the aspect of tourism. With the largest number of foreign and domestic visitors and number of overnight stays, the constant growth in tourism flow and the improvement of the quality of tourist products, it is becoming more and more popular on the tourist map of Europe and the world.

Figure 14: Guided tour of Belgrade
Source: Authors

In tourism and hospitality industry on the territory of the City of Belgrade there are more than 5,500 companies and entrepreneurs. Hospitality and tourism infrastructure is the following (Business Registers Agency, the Ministry of Finance and Economy, and the Economy Department):

- 45 hotels, 4 of which have 5 stars, 18 hotels have 4 stars, 14 hotels are 3-star, 8 hotels are 2-star, and 1 hotel has 1 star;
- 16 hotels garnis, 9 of which have 4 stars, 5 hotels garnis have 3 stars, and 2 hotels garnis have 2 stars;
- 4 annexes;
- 1 motel;
- 1 camping site;
- 475 units of categorized private accommodation, with the capacity of 1,001 beds,
- about 130 uncategorized hospitality accommodation facilities (lodgings, bed and breakfast, and about 80 hostels), and
- around 2,500 hospitality facilities of restaurant type.

According to the current and potential attractiveness of the City of Belgrade from the aspect of tourism, there is an obvious lack of accommodation capacities of the highest category (only 4 hotels with 5 stars). Most of the hotels belong to the three- and four-star category. The natural resources (spas, mineral water springs, parks, forests, mountains, etc.) are not protected and arranged on the necessary level, and they do not contain the adequate equipment for their optimal usage. Also, it is necessary to renew the accompanying accommodation capacities,

Table 5: Tourists' visits and stays on the territory of the City of Belgrade in the period 2008–2018

Year	Tourist arrivals			Tourist overnight stays		
	Total	Domestic	Foreign	Total	Domestic	Foreign
2008	705,574	328,657	376,917	1,431,328	671,485	759,843
2009	602,034	232,457	369,577	1,368,842	540,112	828,730
2010	618,454	223,046	395,408	1,319,629	509,807	809,822
2011	619,124	178,777	440,347	1,337,199	466,227	870,972
2012	660,674	189,375	471,299	1,431,384	493,531	937,853
2013	718,943	182,006	536,937	1,489,801	453,526	1,036,275
2014	753,742	155,977	597,765	1,535,341	393,156	1,142,185
2015	807,607	157,245	650,362	1,686,017	400,323	1,285,694
2016	913,150	176,087	737,063	1,867,150	406,674	1,460,476
2017	1,035,205	172,043	863,162	2,190,474	432,335	1,758,139
2018	1,160,582	188,640	971,942	2,480,516	469,767	2,010,749

Source: Municipalities and regions in the Republic of Serbia 2009–2018, The statistics of hospitality and tourism - December 2018

rehabilitation and recreation facilities, green areas, to improve the reservation system and work technology, as well as to introduce new medical treatment methods, recreation, entertainment, and cultural programs.

In 2008, almost one third (31.13%) of the total number of tourists' visit to the Republic of Serbia were on the territory of the City of Belgrade. During the analysed period, this share did not significantly change, and in 2018 it was 33.83%. The number of domestic and foreign tourists in 2008 was almost equal, whereas in 2018, the number of foreign tourists was as much as 84.34% of the total number. Such a change is the consequence of the constant

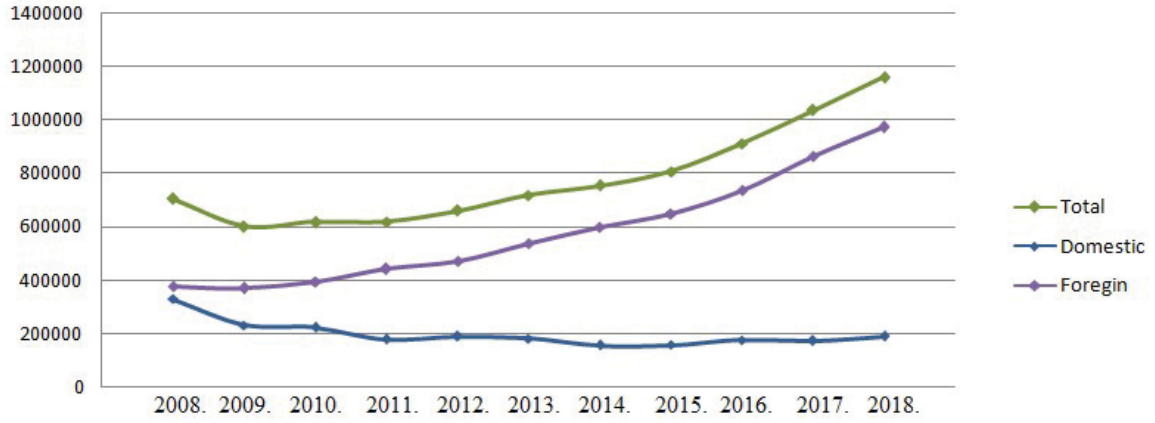


Figure 15: Tourists' visits to the City of Belgrade in the period 2008–2018
Source: Municipalities and regions in the Republic of Serbia 2009–2018, The statistics of hospitality and tourism - December 2018

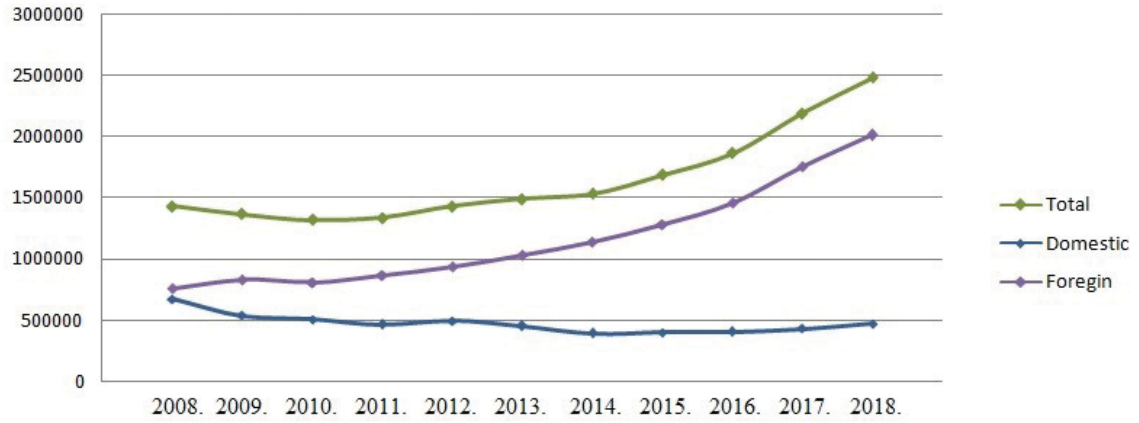


Figure 16: Tourists' stays on the territory of the City of Belgrade in the period 2008–2018
Source: Municipalities and regions in the Republic of Serbia 2009–2018, The statistics of hospitality and tourism - December 2018

growth in the number of foreign tourists, and almost halved number of domestic tourists during this period. The number of domestic tourists until 2018 was 188,640 (only 57.34% of the number of domestic tourist in 2008), with the tendency of a slow growth in the period 2014–2018. On the other hand, the number of foreign tourists almost tripled in the same period and got close to the number of one million.

The average number of domestic and foreign tourists' overnight stays stagnated during the analysed period and it was about 2 nights per tourist visit. As a result, the changes in the number of nights are in direct proportion with the changes in the number of tourists. Such a trend is the consequence of the still underdeveloped offer which would provide tourists (especially foreign ones, whose number is constantly growing) with amenities that would attract them to stay longer in this area.

Figure 17: A view of Novi Beograd from Kalemegdan fortress
Source: Authors

BELGRADE REGION

- VISION, GOALS, CONCEPT AND HIGH-PRIORITY PROJECTS OF THE SPATIAL DEVELOPMENT -

INTRODUCTION AND METHODOLOGY

The analysis part of the paper represents the basis for identifying the key problems, i.e. the development obstacles that characterise the City of Belgrade, as well as the values whose additional activation (with overcoming the identified problems) in the function of the optimal development represents the essence of the defined vision. It represents the framework in which further steps are defined (from general goals to the specific measures and high-priority development projects), whose role is the contribution to its achievement.

This process was more precisely chronologically achieved through the following segments:

1. The analysis of the existing state of the key segments of the City of Belgrade;
2. The analysis of the current development documents which relate to this region (spatial and urban plans, sector strategies, etc.);
3. Identification of the key development limitations and possibilities;
4. Definition of the development vision of the City of Belgrade;
5. Definition of general and specific goals;
6. Designing the development concept;
7. Definition of the necessary measures, and
8. Selection of high-priority development projects.

Analytical and statistical methods represent the main method for processing the obtained data, while the synthesis method connects the definition of the vision itself and the steps that follow it. Cartographic method, according to the character of the research itself, has a clear role and, in terms of software, means data processing and design of cartographic appendices using ArcGIS 10.3.1, QGIS 3.10.0, and AutoCAD Map 2016 programs.

LIMITATIONS, POSSIBILITIES, AND VISION OF THE DEVELOPMENT OF BELGRADE

As the main obstacles (limitations) for the optimal development of the City of Belgrade, the following ones have been distinguished:

1. Inherited (relative) exclusion from the European trends and project of networking, with the negative consequences on the position in the European frameworks;
2. Incompleteness, and to a certain extent, ineffectiveness of the public utility infrastructure systems, with the consequences on the state and quality of the environment;
3. Unfavorable trend of the natural component of the population migrations, i.e. great dependence of the population number and structure on the mechanical inflow;
4. Extreme centralisation – the dominance of the settlement of Belgrade, with insufficient capacities of the defined secondary development poles and the settlements of the lower position in the functional hierarchy of the City;

The basic values from which the possibilities are derived (which can be greatly characterised as the neutralisation of the development obstacles) are the following:

1. The position at the confluence of the river Sava into the Danube, based on which the City of Belgrade has achieved its historical, geographical, and functional distinctiveness;
2. Growing cooperation with the cities in the region;
3. Realised projects of the public utility infrastructure development;
4. Demographic size of the City of Belgrade which comprises significant contingents of staff of various profiles and high quality;

5. Natural and anthropogenic potentials arranged on the whole territory of the City, which provide the base to the secondary poles to achieve their functions in their full capacity;

Based on the previous analysis, and according to the existing potentials and limitations, the vision of the City of Belgrade is defined in the following way:

A modern city open to innovations, turned toward meeting the needs of all its citizens, with efficient traffic, regulated public utility sector, successful and decentralised management, sensible relation to the resources – and a leader among the Balkan metropolitan cities.

The concept of the realisation and accomplishment of the development goals is based on the *positioning* of Belgrade as a regional leader integrated with its surroundings (immediate and European). By realising its own potentials and taking into consideration the comparative advantages, it can be expected that the City of Belgrade will achieve a better position on the "ladder" of competitiveness in the region. Regarding its cooperation with the regions within the borders of the Republic of Serbia, what can be primarily expected is the intensification of the cooperation and further functional connection with the territorial units in the surroundings. The concept of using *natural potentials and resources* will be based on the principles of sustainable development, i.e. on the rational usage of water, soil, mineral raw materials and other natural resources with a more efficient valorisation of the renewable sources of energy. Special attention should be directed toward the establishment of a more efficient system of controlled and designated usage of agricultural land, as well as to the creation of a wider forest zone as an ecological "fender". The limitations in terms of hazards and anthropogenic pollution of the environment must be minimized by the planned measures. The *demographic development* of the City of Belgrade will be based on the population policy with an adequate inter-sector approach, coordination of sector policies, and the implementation of the existing national strategies and programs. The aim of this policy is to slow down the trend of "*brain drain*".

A balanced spatial development assumes the functionality of a three-tier hierarchy of centers and settlements. The starting point is the *system of settlements and centers* formed in the direction of the development of suburban centers which would, besides the dominant settlement of Belgrade, have a role of the carriers of transformations in the surrounding settlements. With the even development of economic activities in them (referring to the secondary poles of the development and the centers of settlement communities), a more even development of the entire territory of the City of Belgrade is expected, i.e. the progress toward the poly-centric region with the deconcentrated function of work and activities. The development of *public services* of the City of Belgrade will be based on the existing capacities, along with their continuous development in terms of availability and quality of services. It is necessary to modernize the existing capacities, to adapt them to the modern way of living and to adjust them to the needs of all the inhabitants.

POSITION AND COOPERATION WITH THE SURROUNDINGS

The main aim related to the position of the City of Belgrade is the improvement of the accessibility to all the settlements of the City of Belgrade, both to the settlements in its vicinity and from the wider surroundings within the borders of the Republic of Serbia, as well as to the cities in the countries in the region.

In order to achieve that goal, in the future, it is necessary to realise the following ***specific aims***:

1. Obtaining a more significant position of the City of Belgrade in wider European frameworks in the system of metropolitan cities in Europe
2. Better cooperation between the city settlements from the surroundings that belong to the functional region of the City of Belgrade.

The ***concept*** of the development of Belgrade in this domain is based on positioning Belgrade as a regional whole which tends to integrate with its immediate and European surroundings. Based on its geographical and functional position, the City of Belgrade has its rights and obligations to establish the cooperation by using all its available resources, primarily via Corridors 7 (Danube) and 10, whereas the arterial route Belgrade-Vršac-Timisoara enhances the significance of this position.

In the context of the realisation of the goals, the following ***steps*** have been defined:

- Reducing the significance of the administrative borders on the Danube, i.e. the border between the

City of Belgrade and AR Vojvodina;

- Inclusion into the European project of cultural routes in Podunavlje for the purpose of the affirmation of rich traces of great cultures which were present along the Danube in the past (prehistoric, Roman, Byzantine, Ottoman, Central European), and which best integrate the regions of this part of the continent;
- Connection and enhancement of the accessibility to the City in the regional context for all the types of traffic, as well as of all the arterial energetic, hydro-energetic, and information-telecommunication systems, which would enable the integration of the City of Belgrade into the unique European network.

NATURAL POTENTIALS AND LIMITATIONS

Natural potentials and limitations that are mentioned and listed in the analysis section need to be adequately used, fixed, and reduced. Thus, the ***general goal*** is the sustainable usage of natural potentials and resources and overcoming of natural limitations in the area, along with the overall protection of the environment.

The ***specific goals*** in the domain of using the natural potentials are the following:

1. *Water supply:* integral organisation, preservation, protection and usage of water, improvement of water quality, with the rational usage, as well as the solution of the problems of waterless terrains;
2. *Exploitation of mineral raw materials:* the goal is a planned and economical usage of mineral raw materials (coal, oil, gas, etc.) with adequate safety measures, with the aim of becoming competitive in the domestic and world market;
3. *Agriculture:* the aim of agricultural production is nutrition and production of healthy food, and in the field of using and protection of agricultural soil, it is necessary to prevent the land-use conversion for other purposes;
4. *Forests:* the aim of the usage and protection of the forest ground is turning the degraded ground to its natural main purpose and taking the appropriate actions regarding afforestation.

The ***specific goals*** in the domain of overcoming the natural limitations are the following:

1. *Recovery of landslides:* definition of locations with the risk of land sliding and prediction of damage due to the occurrence of land sliding or rock sliding;
2. *Protection from floods:* integral arrangement, protection, and usage of water in the region of Belgrade;
3. *Protection from earthquakes:* definition of seismic risks on the territory of the City of Belgrade and systematic prediction of damage from expected earthquake, as well as the introduction of preventive protective measures;
4. *Protection of water courses:* prevention of further drainage of polluting matters into the recipients and the improvement of the quality of surface water courses.

The concept of development in this area is based on the fact that natural potentials exist, and that they need to be used in an adequate way, through sustainable usage. Natural potentials are characteristic for the territory they are on and their usage in an adequate way results in the improvement of comparative advantages of the territory itself. Planning the development on all the levels must be done on the principles of sustainable development, which implies the rational usage of natural resources with the prevention and improvement of ecological potentials of the terrain.

In the context of the realisation of the goals, the following ***steps*** have been defined:

Table 6: Measures for realising the goals

water supply	• connecting Mladenovac to the regional water supply system of Belgrade • replacement of asbestos pipes which are used in the water supply system
exploitation of mineral raw materials	• doing thorough research in the wider zones of the well-known finding sites • recultivation of the abandoned mines
agriculture	• introduction of the system of fines for the conversion of the agricultural soil into non-agricultural purposes
forests	• afforestation of devastated forest regions
tourism	• Improvement of the quality of natural potentials for the most diverse forms of recreational activities. • using the tourism information systems for the improvement of the efficiency of tourism planning
recovery of landslides	• monitoring of the unstable terrains • strict compliance with the building standards and norms
protection from floods	• reconstruction of the defence embankments on the river Sava. • drainage of Pančevo Marsh and Makiš
protection from earthquakes	• aseismic construction of facilities
protection of water courses	• construction of plants for the purification of waste waters

DEMOGRAPHIC DEVELOPMENT

The ***general goal*** of the demographic development of Belgrade is the reduction of negative trends through raising the awareness of the demographic problems, stimulation of birth rate growth, and the achievement of the simple renewal of the population in a long period of time.

Specific goals of the demographic development are the following:

1. The reduction of the phenomenon of insufficient number of births by applying the population policy.
2. The reduction of the emigration of highly-educated population.

The concept of the demographic development is based on the implementation of the national strategies and programs, primarily the Strategy of the stimulation of birth. Even though the region of Belgrade has far more favorable demographic performances than the rest of the state, the rise in the number of inhabitants must not continue to be based exclusively on the immigration of inhabitants from other parts of the country. It would not be sustainable since the emigration capacity of Serbia is reducing, the population growth has been low for decades, and the fertility is not on the level sufficient enough for the simple reproduction of the population. In such conditions, there is a real danger that in the next census Belgrade might record a fall in the number of inhabitants, and that the trend might continue even after 2021. That is why one of the aims of the demographic development of the City of Belgrade is the reduction of the negative population growth rate, and, for the beginning, the level of the simple renewal of the population should be achieved. The achievement of the goals of the population policy requires an integral approach and the improvement of the population's quality of life, the creation of a stable economic and political situation, the improvement of the quality of public services, primarily health care and education. Thus, a good population policy requires an inter-sector approach and the coordination of the sector policies, primarily the ones of social and health care, education, labor, and employment.

One of the most important strengths of Belgrade is the educated population – the share of illiterate population in Belgrade is constantly falling, and the share of highly-educated inhabitants is high. However, the trend of "*brain drain*", i.e. the emigration of highly-educated staff, is a serious problem. Young and highly-educated people are maybe the most important resource of Belgrade, and the whole Serbia, and that is why that problem must be very seriously dealt with.

In the context of the realisation of the goals, the following ***steps*** have been defined:

Goal 1 - The reduction of the phenomenon of insufficient number of births by applying the population policy:

- Direct financial support to families with children in order to provide help with the economic price of parenthood; this comprises financial help in terms of parental support and parental income; it has proved that the financial help has a positive effect since it facilitates the unfavorable financial situation of the families with children compared with those without children;
- support to young people and families with children in solving the housing issues through offering favorable housing loans;
- Subventions of the costs for the care and raising of children from sensitive categories (unemployed, low income, families with a lot of members, families with financially dependent members);
- Harmonization of employment and parenthood, as a key for achieving a higher fertility rate and the reduction of the disharmony between the reproductive plans and the achieved fertility in case of a lot couples;
- Preservation and improvement of the population's reproductive health, with a special accent on the good health care of mothers and children;
- Population education of the nation, raising the people's awareness of the existing demographic problems and the consequences that may arise from them.

Goal 2 - Prevention of the outflow of highly-educated population:

- Adequate mobilisation of scientific-research capacities, especially in the function of the economic development, through the networking of business and scientific-research sectors;
- Various types of support for young scientists and researchers through different kinds of direct financial help (e.g. scholarships), help in finding a job, offering favorable housing loans, etc.

SYSTEM OF SETTLEMENTS

The **main goal** in the development of the system of settlements and centers of Belgrade region is the establishment of the functional hierarchy of settlements which will contribute to the further transformation of a region with a strong core and weak outskirts into a poly-centric region with suburban development centers which will take over a part of function and spatial competences of the settlement of Belgrade.

The specific goals of the development of the system of settlements are the following:

- Stronger connection of the settlements of the City of Belgrade by the connection system in the relation between a village and the center of the settlement community, the center of the settlement community and the urban center, the urban center and Belgrade; Strengthening of functional and economic capacities of the municipalities on a lower hierarchal level;
- Stronger cohesion of the space through the increase of the level of accessibility to all the parts of the City of Belgrade;
- Stopping the process of illegal building.

The settlement of Belgrade, together with the sub-regional and smaller urban centers on its territory, and using the policy of poly-centrism, should take the leading position in the constellation of the metropolis on the Balkans. Encouraging the development of smaller urban centers and urban settlements (less dependent on larger centers in the surroundings), as well as (re)defining and improvement of the relations between urban and rural regions, will have the aim to reduce the differences in the relations between the developed and undeveloped municipalities, and, before all, the differences between the Settlement of Belgrade and the rest of the territory of the City of Belgrade. Accordingly, it is necessary to encourage the expert public and the authorities on the level of the city and the state to encourage and control the physical development of urban centers and villages, their planned development, and adequate location of activities throughout the territory of the City. In that manner, it would be of great benefit to deconcentrate the functions of work through the creation of stronger sub-regional centers (even the smaller centers on the local level) in the system of the City of Belgrade.

The concept of the future development predicts the development of the existing three-tier hierarchy of centers and settlements, and aims, through the development of suburban centers, to contribute to the creation of the more rational network of centers which will be the carriers of the transformation of the surrounding settlements. These centers should enable the rearrangement of economic activities in a way that would contribute to the overall development of the settlements on the territory of the City of Belgrade.

The realisation of the goals requires the following measures:

- Enhancing the role, capacity, and responsibility of the local authorities – relocation of certain functions and public services to some of the urban centers of the City of Belgrade;
- Reconstruction of villages in a specific way which would improve the quality of life in a village – toward the modernisation according to the real abilities of the inhabitants and the significance in the network of settlements of local self-governments and the City of Belgrade;
- Founding and operation of small- and medium-sized companies with 50–250 employees as the main carriers of the economic development (especially in the municipalities of Barajevo, Sopot, and Grocka, but also in other regions and in the centers of settlement communities).
- The development of the network of the local infrastructure, with the connection and accessibility of the City for all the types of traffic in the regional context;
- Establishment of the strict and efficient control of using soil – prevention of further illegal usurping of soil and illegal building;

DEVELOPMENT OF TRAFFIC

The strategic decision of the City of Belgrade represents an even development of the traffic system based on the principle of sustainable mobility and the change of hierarchy between the types of transport.

The development of Belgrade and an important traffic junction point assumes the realisation of the road and street network, railway, infrastructure, the development of water-borne traffic, and further modernisation and development of "Nikola Tesla" airport – which would primarily improve the accessibility of the city in relation to the region of the southeastern Europe, and thus provide the possibilities to generate a wider scope of transport

services.

The plan of sustainable mobility in Belgrade in the future is based on the strategy of creating the grounds for a more equal accessibility of all the city areas respecting all the principles of safety, on the improvement of the state of the environment, the increase of efficiency of means of transport, and the arrangement of the spaces in the city according to the needs of its citizens. The approach to solving the problems in the traffic is no longer done in a traditional way through the construction of infrastructure and its adapting to the needs – the recent world trends impose the measures which motivate the citizens to use their cars less and to do their daily activities using other, non-motor ways of moving around. This approach is justified by the fact that the EU laws contain the plans of sustainable mobility which are based on this principles and which have a strategic aim to help the improvement of the quality of life in the cities in that way.

The concept of urban mobility represents a new practice in traffic planning – in order to satisfy the citizens' current and future needs for mobility, and ensure a better quality of life in the cities and their surroundings. Such "People-friendly cities" (not car-friendly) are a legal obligation for the cities of the EU country members. Interesting facts can be seen in the number of daily travels made in Belgrade whose number is 3,031,715 based on the number of citizens (1.65 million), where 1.56 million is older than 6 years of age. It results in the average of 1.94 travels on a business day per person. The chart below shows the distribution of travels by the types of transport for daily travels in Belgrade. The main one is walking (23.8%), private cars (25.7%), and public transport (47.9%) – which covers 97.5% of all the travels, while a bicycle or a motorbike is used by only 1.3% citizens (http://beogradzivi.rs/Tema/a154-Saobracaj-i-transport-Beograd-zivi.html).

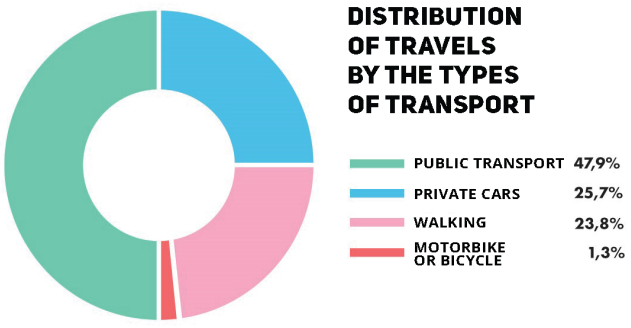


Figure 18: Distribution of travels by the types of transport
Source: http://beogradzivi.rs/, SMARTPLAN, 2017

The percentage of the share of the public transport in Belgrade can be considered as relatively high (almost 48%), which is an excellent result in comparison even with the cities of Western Europe which are famous for their good public transport, and have a significantly lower share of this type of transport in the distribution – e.g. Berlin with 24.6% or Zurich with 23%. With the encouraging starting conditions in the current state of the daily distribution by the types of transport, the further development of traffic infrastructure should go in three main directions – development of BG train, the first two metro lines, and the investments in the road infrastructure (http://beogradzivi.rs/Tema/a154-Saobracaj-i-transport-Beograd-zivi.html).

Integrated railway traffic system in Belgrade

The focus of the development is primarily on the enhancement the operation of "BG train" and on the metro project – special attention should be paid to these mass types of transport since the results clearly show the importance of future investments in the system of public transport. At the moment "BG train" has one line, from Batajnica to Vukov spomenik and, from there, further to Ovča, but it is necessary to reconstruct the railroad and the networks for a new line from Vukov spomenik to Resnik.

The next step in expanding the system is the connection of "Nikola Tesla" Airport and Surčin with Novi Beograd, and then one more line remains – from Makiš field, through the tunnel Makiš-Rakovica to Karaburma. With new trains, the improvement of service, and the new station, "BG train" will be a light railway system that will be able to satisfy the citizens' needs. It is planned to use the existing infrastructure, which can provide the most for relatively little money.

The construction of Belgrade metro has been planned since 1958, and even though there have been numerous initiatives and studies, the realisation of the project became certain at the end of 2014. France financed the study on the General plan for the metro project which should be performed in three construction phases (three years are planned for the completion of each phase).

The first line of the metro should go from Makiš field, over the city center, to Mirijevo, in the total length of 22 km, and the second should go to Zemun, over Stari grad, to Ustanička street, in the length of 19.8 km – and these two lines, in combination with "BG

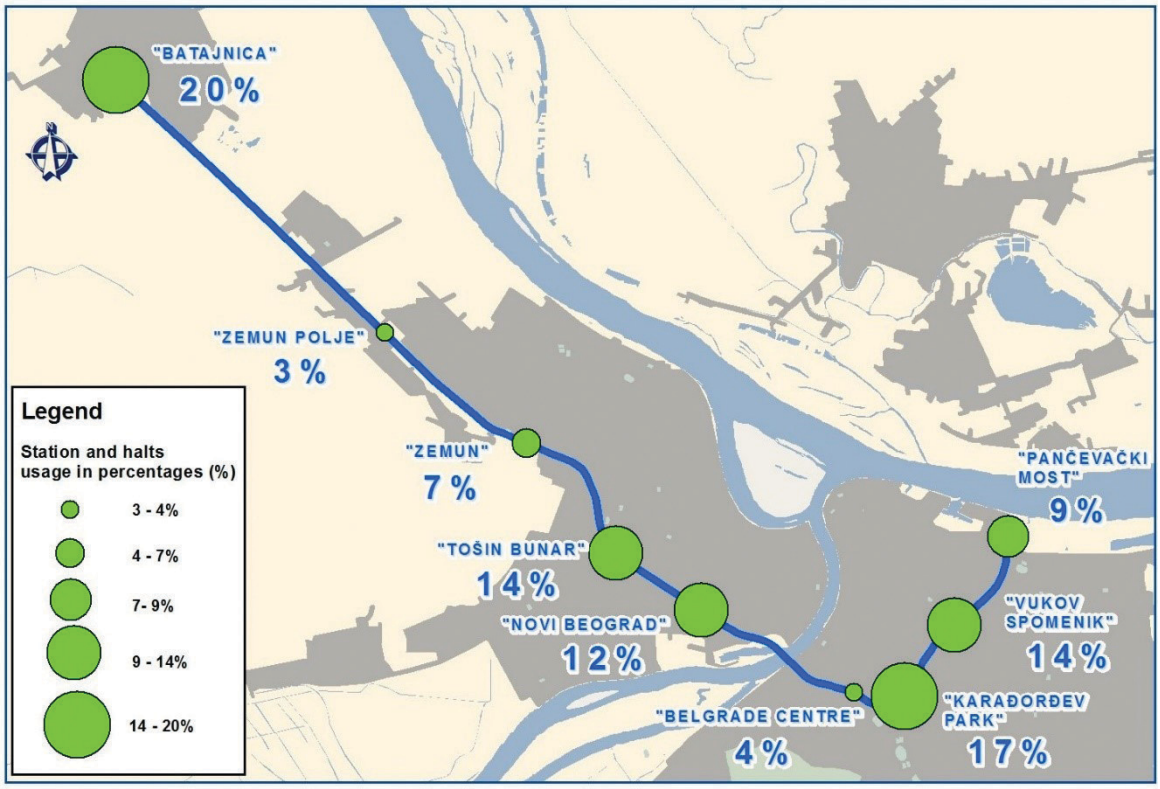


Figure 19: Stations and the percentage of their usage on the existing line of BG train
Source: JKP BG metro i voz, 2018

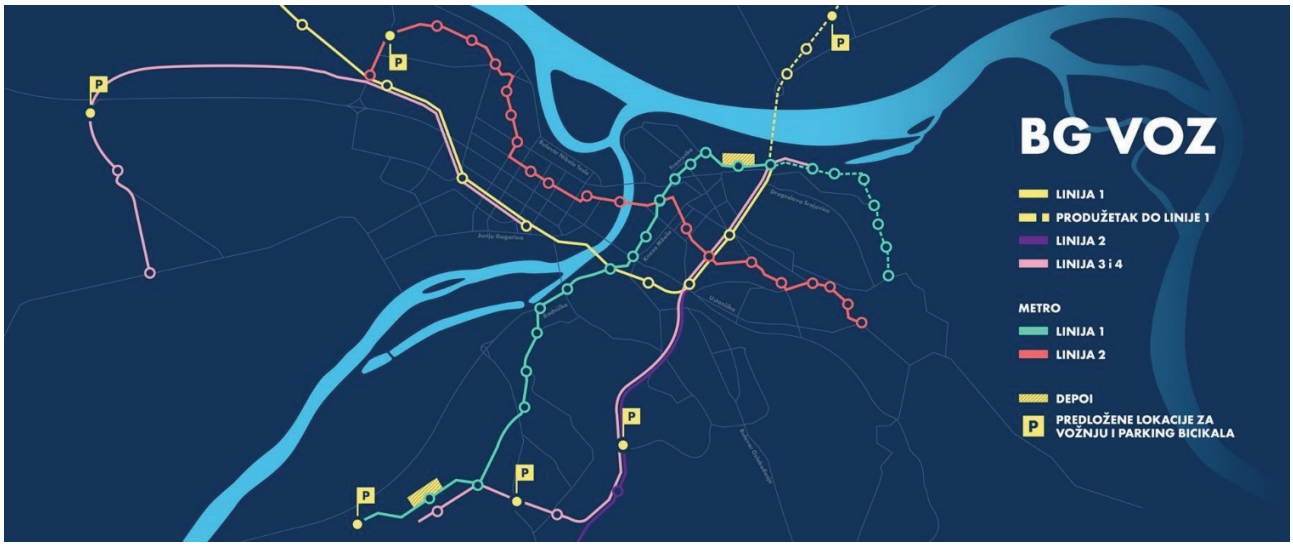


Figure 20: Plan for the integrated railway system of Belgrade
Source: http://beogradzivi.rs/

train", together with the reconstructed tram system, comprise the integrated railway traffic system (SMARTPLAN, 2017)

Road infrastructure

In order to ensure the undisturbed development and follow the citizens' needs and investors' requirements for a better infrastructure – large investments started on numerous fronts. The most important ones are the constructions of the road infrastructure, i.e. of the ring road, railway infrastructure (new main stations), new bus station, metro, and airport.

- Northern arterial highway tangent (SMT)

In cooperation with Chinese partners the construction of the northern part of the outer arterial highway tangent of Belgrade is being realised. The project includes the construction of several new sections, as well as the adaptation of several current ones for the purpose of closing the

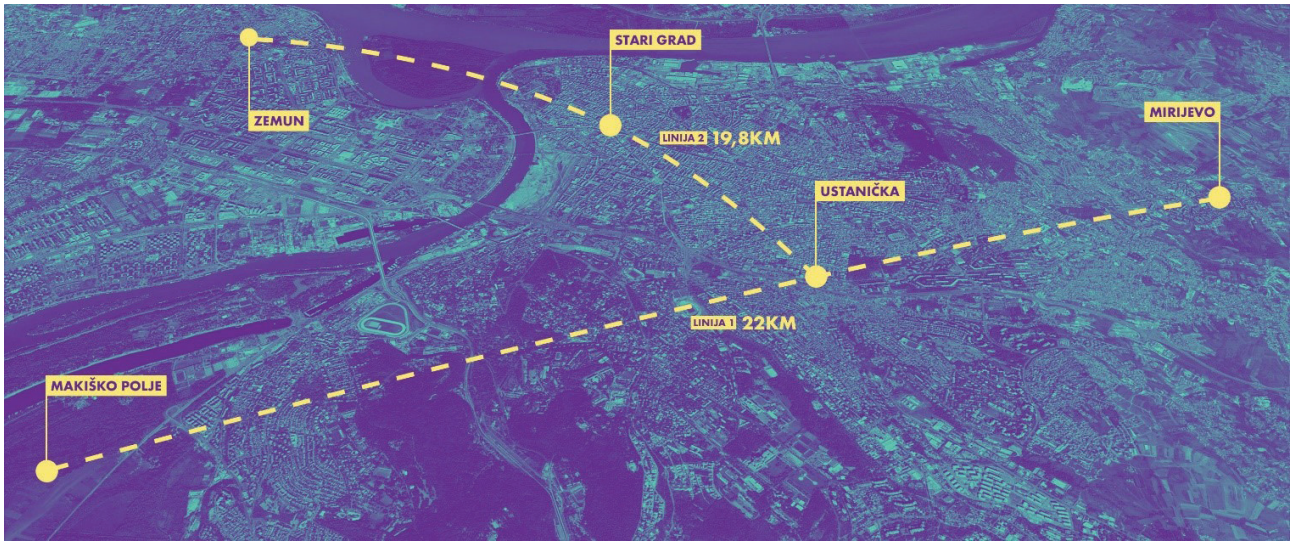


Figure 21: Points that will connect the first two lines of Belgrade metro
Source: http://beogradzivi.rs/

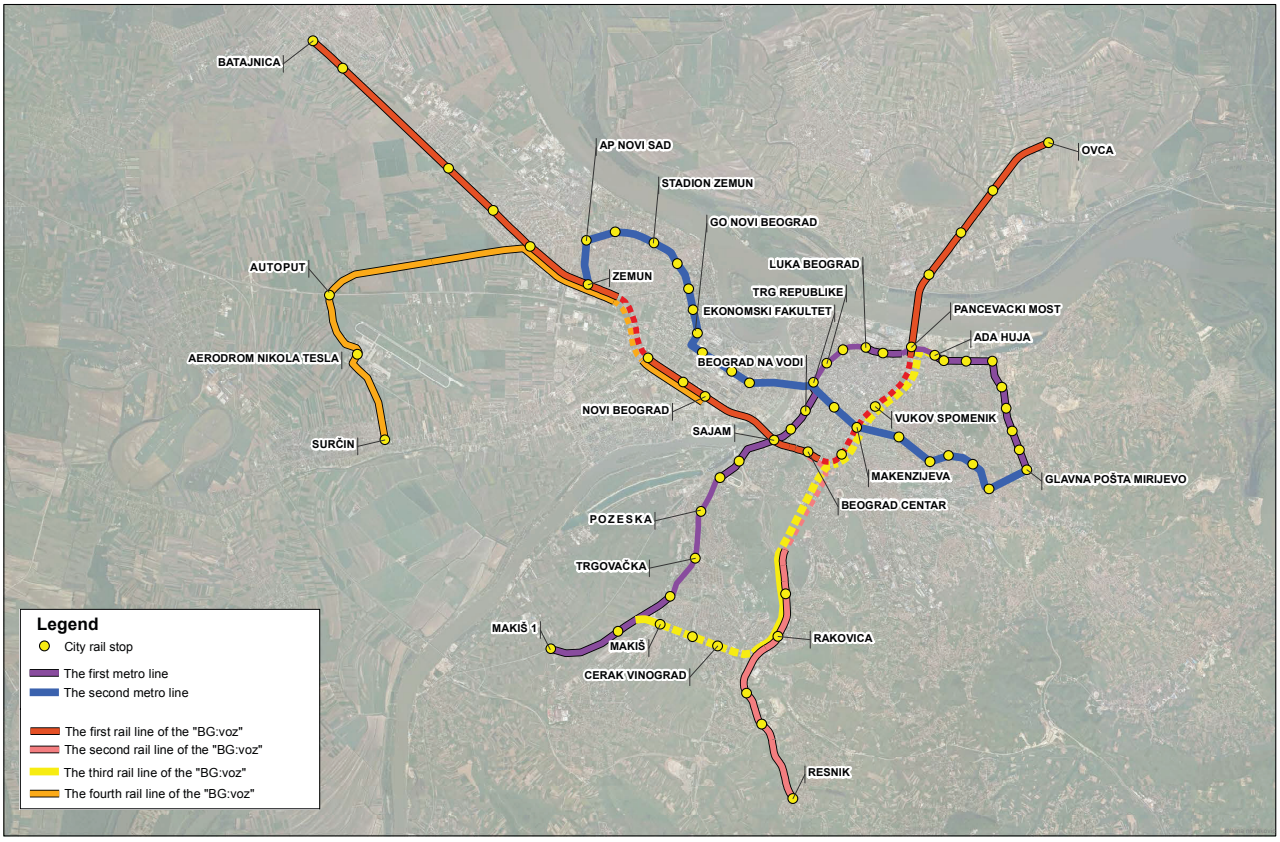


Figure 22: Network of BG train and the first two metro lines – projection for 2033
Source: JKP BG metro i voz, 2018

traffic ring around the city and to achieve better communication among the citizens. The sections of this project, with the length of 21 km, also include a new bridge over the river Danube which, since 2015, has been connecting the municipalities of Zemun and Palilula – and over half a million citizens who live on the territory of these municipalities.

A special significance of this project, and maybe the greatest benefit for the citizens of Belgrade, was the redirection of the heavy-load and transit traffic from the city center, and making space for rearrangement and construction in the most attractive parts of Belgrade.

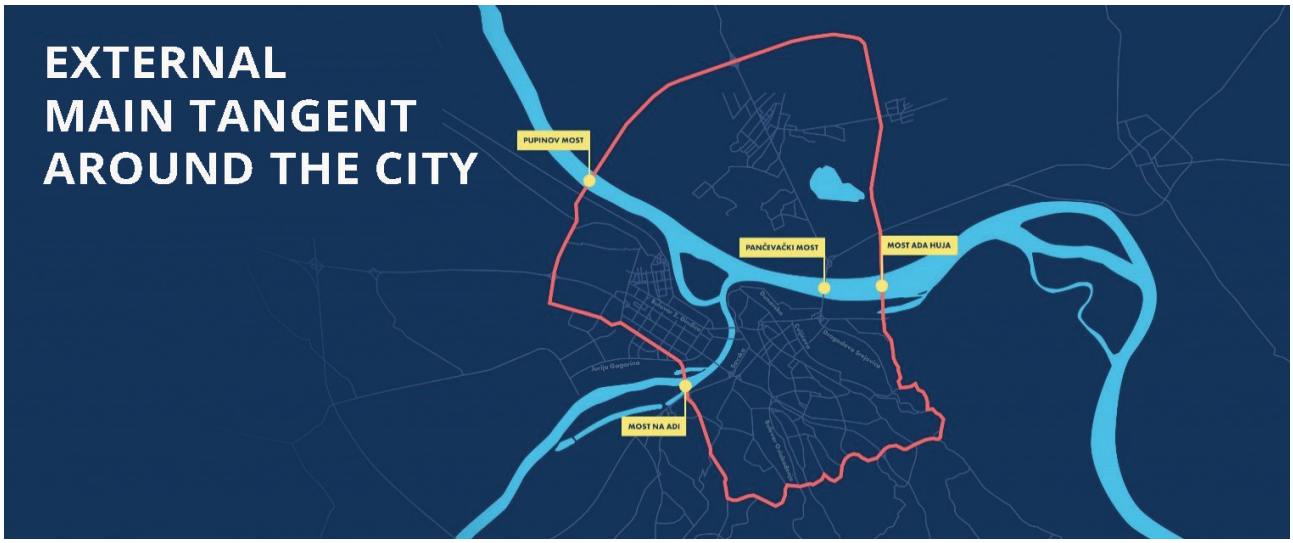


Figure 23: Northern arterial highway tangent (SMT)
Source: http://beogradzivi.rs/

- Inner city semi-ring road (ICSRR)

In order to free the city from the unnecessary transit traffic, three ring-shaped roads are being constructed around the city, and it is also planned to build two bridges and two tunnels. The ring road, i.e. the outer ring around the city is in its final phase; The middle ring, so-called SMT, after the opening of "Pupin's bridge" and its extension to Pančevački put, got a new Boulevard of Heroes from Košare which has connected Ada Bridge with Tošin Bunar, and next year it will get its extension toward Rakovica.

The inner arterial highway semi-ring will start with Topčider tunnel. A project has been adopted for the transformation of the Old tram bridge which will get two more lanes in each direction, as well as new pedestrian and bicycle lanes. As an extension to this bridge the preparations are under way for the construction of a tunnel which will connect Sava and Danube amphitheatres, which will reduce the transit traffic in the city center for as much as 11.5% (http://beogradzivi.rs/Tema/a154-Saobracaj-i-transport-Beograd-zivi.html).

Railway and bus infrastructure

The new main railway station Belgrade (Prokop)

In order to free the space of Sava amphitheatre for construction works, it is necessary to relocate the today's main railway station to a new location. This is the project which represents the completion of the construction of Belgrade railway junction, which started far back in 1970s.

Figure 24: Inner city ring road (ICRR)
Source: http://beogradzivi.rs/

The new station has been designed as a future junction point for 50 million passengers annually. The construction works on the access roads are in the final phase, while for the station itself the design of the station building has been finished, and currently there is an open invitation for a partner who would build the commercial facilities next to the station building (Figure 22).

The building of the old Railway station will be turned into a museum, and the plateau in front of it will be reconstructed and the monument to the founder of the Serbian state, Stefan Nemanja, will be placed there.

"Blok 42" Complex – Novi Beograd railway station and the main bus station

The new main bus station should redirect the intercity bus traffic from the center of Belgrade to the location which, in terms of infrastructure, has excellent connection with all the parts of the city. Within the relocation design, another smaller station is planned on the location of Autokomanda.

The works on the construction of the new bus station in Block 42 in Novi Beograd started in February 2018. The uniqueness of the new station will be that it will be a junction point for intercity, long-distance and tourist traffic.

"Nikola Tesla" Belgrade airport

Belgrade airport is one of the airports with the fastest growing number of passengers. One of the reasons for this trend is also the strategic partnership of Air Serbia and Etihad. This is also one of the most successful projects of the Government of the Republic of Serbia which kept the share of 51% in the national airline – and within this transaction, 10 more Airbus planes of the last generation were bought. In 2014, Air Serbia had 2.3 million passengers, 68% more than in 2013.

The growing trend continued in the next year, so "Nikola Tesla" airport reached its maximum of capacity of about 5.5 million passengers a year. Within the expansion of the capacities of the airport, it is planned to build one more runway, as well as the railway connection of the airport with the city center (http://beogradzivi.rs/Tema/a154-Saobracaj-i-transport-Beograd-zivi.html).

Bicycle lanes

There is a plan that Belgrade will get another 120 kilometers of bicycle lanes in the next few years. There is a wish that this means of transport should not be used exclusively for recreation, but also as a means of transport to travel to work, university, school, etc. The roof aim is to create a new hierarchy in traffic according to which the pedestrians and cyclists will be at the top of it (http://beogradzivi.rs/Tema/a150-Grad-kranova-Beograd-zivi.html).

Bicycle lanes will be constructed in the following streets: Kneza Miloša, Savska, Nemanjina, Ustanička, Južni Bulevar, Cara Dušana, etc. – as well as in parks: Kalemegdan, Hajd Park, Tašmajdan. Also, thanks to

Figure 25: The future layout of Train Station Belgrade Center - "Prokop"
Source: http://beogradzivi.rs/

Figure 26: Airport "Nikola Tesla" in Belgrade
Source: https://www.exyuaviation.com/2018/11/belgrade-airport-takeover-within-weeks.html

the public-private partnership, the citizens will have 1,000 public bicycles available in 150 places in the city.

The metropolitan area of the City of Belgrade, regardless the administrative borders, should strive for the operationalisation of its functional macro-region which will enforce a comprehensive policy of spatial and economic development, competitive in European terms. The central zone of Belgrade will still be the area where the main motion will be initiated, but with the necessary work on the economic, urban, transport, public utility, energetic, social, and institutional development, as well as on the improvement of the quality of the environment.

The review of the relations among the types of transport, especially in the central city zone, the definition and creation of the new zones and pedestrian areas, and the expansion of the existing pedestrian zone in the center of Belgrade, is one of the directions of the elaboration of the project IME (Identity, Mobility, Ecology). Investing in the traffic infrastructure will enable a greater and more even

Figure 26: Existing and planned bicycle lanes in Belgrade
Source: Authors based on the figure from http://beogradzivi.rs/

accessibility of all the parts of Belgrade, which will be a motion power for further investments in the production, tourism, and other economic branches. The favorable location and accessibility of Belgrade by more types of transport gives the advantage to forming the dimension of inter-modality. The completion of Belgrade railway junction point, the segregation of freight and passenger routes on the railway, the completion of the Ring road of Belgrade and other tangent roads, the construction of a new port in the zone upstream from "Pupin's bridge", as well as further construction and modernisation of "Nikola Tesla" Airport are the preconditions for the city inter-modality.

Table 7: High-priority development projects of the City of Belgrade

	High-priority projects	Responsibility for the project realisation	Financing source	Deadline for the project completion
1.	Creation of a metropolitan area without the limitations of administrative borders, i.e. the creation of a functional region with the defined policy of the spatial and economic development.	– Ministry of Public Administration and Local Self-Government – the Administration of the City of Belgrade	– the Budget of the Republic of Serbia – the Budget of the City of Belgrade – IPA II – European Region Development Fund – ERDF	period 2030-2035
2.	Introduction of the system of fines for the conversion of the most fertile agricultural soil into non-agricultural purposes.	– Administration for the agricultural soil (part of the Ministry) – Secretariat for inspection affairs of the City of Belgrade	– European Agricultural Fund for Rural Development – EAFRD – IPA II	the year 2024
3.	Reconstruction of the defence embankments on the river Sava.	– Ministry of Construction, Transport, and Infrastructure – Secretariat for urbanism and construction affairs of the City of Belgrade – Agency for the environment protection	– EU Solidarity Fund European Bank for Reconstruction and Development -EBRD the Budget of the Republic of Serbia	period 2025-2030
4.	Construction of plants for the purification of waste waters.	– PUC "Belgrade water supply and sewage system" – The Ministry of Environmental Protection	– Fund for the environment protection – Public-private partnership – the Budget of the City of Belgrade	the year 2024
5.	Direct financial support to families with children, in cooperation with the state administration.	– Ministry of Labour, Employment, Veteran and Social Affairs	European Bank for Reconstruction and Development -EBRD the Budget of the Republic of Serbia the Budget of the City of Belgrade	period 2020-2030
6.	Improvement of spatial capacity and equipment in health care institutions	– City institute for public health Belgrade – The Ministry of Health	European Bank for Reconstruction and Development -EBRD the Budget of the City of Belgrade	the year 2030
7.	The extension of the network of preschool institutions	– Ministry of Labour, Employment, Veteran and Social Affairs	– The Budget of the City of Belgrade and the Unit of local self-government – Private capital	the year 2024
8.	Improving the efficiency of the existing traffic systems: standardisation and modernisation of technical elements, traffic infrastructure, traffic facilities, signs, and traffic regime.	– Ministry of Construction, Transport, and Infrastructure	– the Budget of the City of Belgrade	period 2020-2030
9.	Construction of the second runway of "Nikola Tesla" Airport	– Ministry of Construction, Transport, and Infrastructure	– the Budget of the Republic of Serbia – the Budget of the City of Belgrade – Public-private partnership	the year 2035
10.	Subway construction - line 1	– Ministry of Construction, Transport, and Infrastructure – Foreign contractor in cooperation with "Belgrade"	– the Budget of the Republic of Serbia – the Budget of the City of Belgrade – Public-private partnership	the year 2035

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PHOTO ALBUM

WORKSHOP IN BELGRADE


12. Conclusions
Centralism of Ljubljana
Traffic problems
Land use conflicts
Higher housing prices in the capital
The most developt economic region

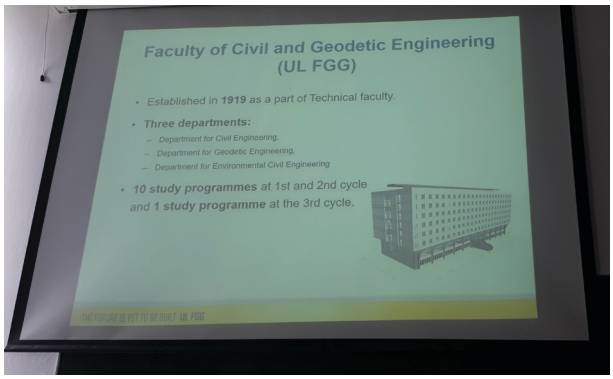

Vision of the Ljubljana urban region with focus on sustainable mobility
Analytic faze of the project
April 2019

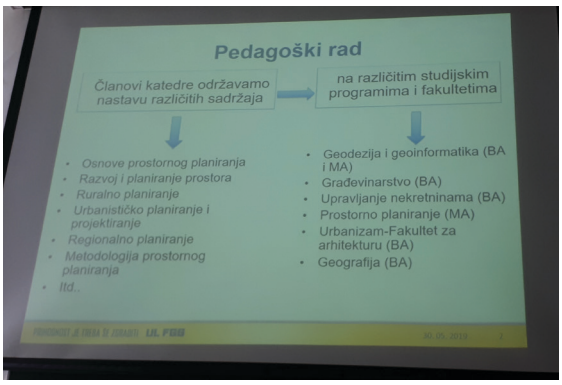

Beograd
Ljubljana
poplave
klizišta
zaštićena područja
zelene površine
poljoprivredno zemljište

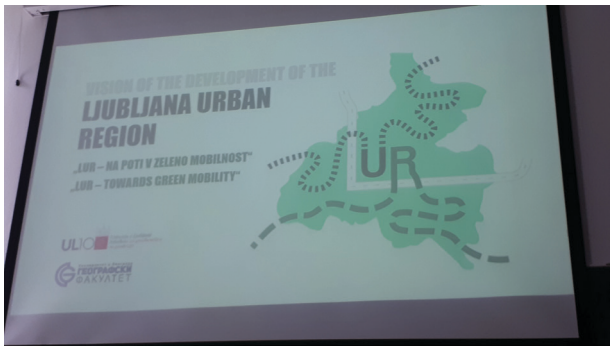

Airport City

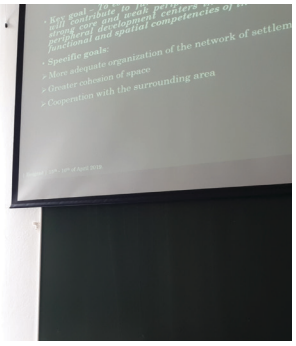

Airport City

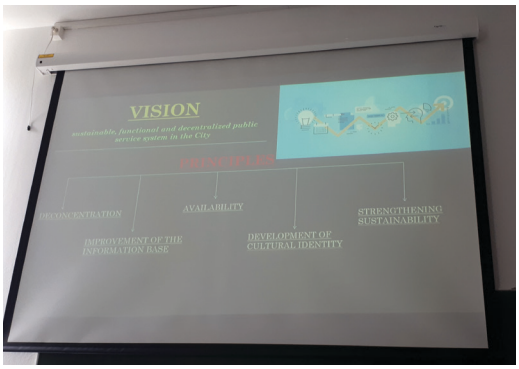
WORKSHOP IN LJUBLJANA

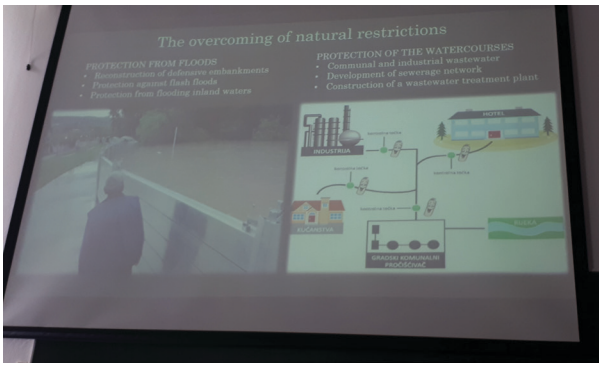





VISION OF THE DEVELOPMENT OF THE
LJUBLJANA URBAN REGION
„LUR – NA POTI V ZELENO MOBILNOST"
„LUR – TOWARDS GREEN MOBILITY"
LUR


Specific goals:
More adequate organization of the network of settlem
Greater cohesion of space
Cooperation with the surrounding area

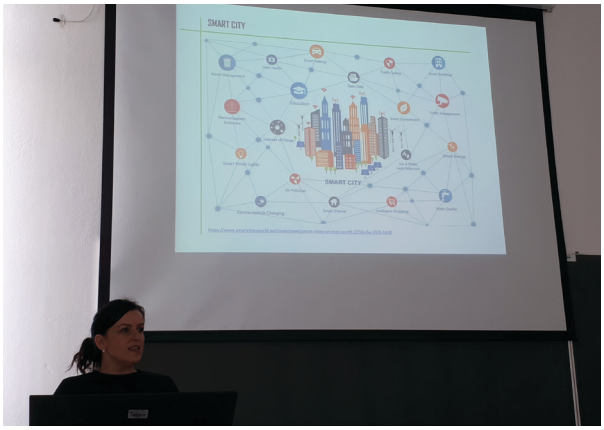

VISION
sustainable, functional and decentralized public service system in the City
PRINCIPLES
AVAILABILITY
STRENGTHENING SUSTAINABILITY
IMPROVEMENT OF THE INFORMATION BASE
DEVELOPMENT OF CULTURAL IDENTITY

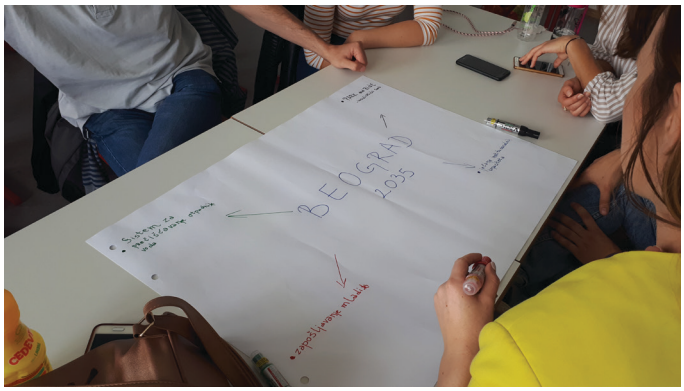

The overcoming of natural restrictions
PROTECTION FROM FLOODS
Reconstruction of defensive embankments
Protection against flash floods
Protection from flooding inland waters
PROTECTION OF THE WATERCOURSES
Communal and industrial wastewater
Development of sewerage network
Construction of a wastewater treatment plant
INDUSTRIJA
HOTEL
REČICA


Traffic in Belgrade


Danube region strategy
Railway logistics network on V. TEN-T corridor


REVITALIZACIJA GRADA: OD VIZIJE DO IMPLEMENTACIJE


SMART CITY
SMART CITY


BEOGRAD
2035


BE GREAT
BEOGRAD
2035

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Народна библиотека Србије, Београд

378.18

PROSTOR : list studenata prostornog planiranja / urednici Velimir Šećerov, Mojca Foški, Branko Protić. - God. 1, br. 1 (dec. 1995)- . - Beograd : Univerzitet u Beogradu, Geografski fakultet, 1995- (Niš : Grafika Galeb). - 29 cm

Polugodišnje.
ISSN 1451-4931 = Prostor (Beograd)

COBISS.SR-ID 119261964